COAL AGE

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A Parting Word

Dear Friends:

Nearly eight years ago the first copy of a small and modest, but rather hopeful, mining weekly was submitted for the attention and approval of the coal fraternity. That paper was COAL AGE, and almost to a man the original crew that embarked on the journalistic adventure is still busy trimming sails and bailing out the water that was shipped in occasional high seas.

Unlike most editorial organizations of a similar nature, the staff of COAL AGE had a chief in name only. Of course, it was necessary to have someone sit in the pilot-house, look at the compass and see to it that the boat didn't run in circles, which job was mine. And although at first I felt quite necessary at the wheel, it soon became evident to me that the rest of the crew also knew north from south and were perfectly able to perform the captain's duties at any and all times.

It is a fact, therefore, that my associates on this journal have never worked for me, but always with me. We have all shared alike in the numerous discouragements and felt equal joy over the successes. If the respect and friendly cooperation of America's great coal industry has been gained, it was accomplished through the paper constantly reflecting the ideals, not of one man, but of several loyal workers, who have stood fast on the platform that modern industry is a four-cornered affair. It must deal squarely, not only with capital and labor, but also with the people as represented by the state, and brains as represented by management.

I am resigning from COAL AGE with this issue, after having spent the happiest years of my life in helping build it. If I were not certain of the great future of the paper, nothing could induce me to leave; if I were not aware of the splendid abilities of my associates who will "carry on" so successfully, no possible inducements could lure me away.

The coal industry is the one business I have served continuously since the day I left college to earn my first dollar. No man can labor in the dark chambers of Mother Earth, face the perils of death that lurk there, help carry the lifeless forms of his buddies to daylight, and then forget. I have my friends in and about the mines in thirty states. To me they constitute the greater part of the whole world in which I move, and I want it always to be just that way. No doubt I can take my body elsewhere, but the heart of me stays in the mines.

In the new field I enter, it is my hope that there will be opportunities to serve the great industry I love, and if such chances appear, it will be no fault of mine should I fail. But the real editorial work that will be of profit to the coal industry in the future, as in the past, will, of course, be carried on in COAL AGE. R. Dawson Hall, who has worked hand in hand with me from the day of the christening, has qualities so rare they arouse in me a feeling of envy. Indefatigable in his work, loyal to his friends, uncomplaining when the way is rough, consistent and faithful to the demands of justice, he has grown largely in the esteem of his intimates and the respect of his company.

No men are better equipped to continue the plans and policies of this journal than Messrs. Hall, Beard, Kneeland, Moss and Harris. What little there will now be of added responsibility for them will be taken care of by the greater play of latent powers that now have a still better opportunity for individual expression. COAL AGE has preached humanity and democracy in industry, and we are happy to apply these teachings in our own case by recognizing and rewarding merit. When a company must go outside its organization to pick men for the jobs higher up, there need be no doubt of the injustice and inefficiency of that corporation's management.

If the words here used and the method employed in thus saying adieu are at all unusual, it is because my feelings in the matter are unusual. In my heart at this moment are but two thoughts: The first—Thanks for ten thousand favors; the second—good luck and an ocean of success.

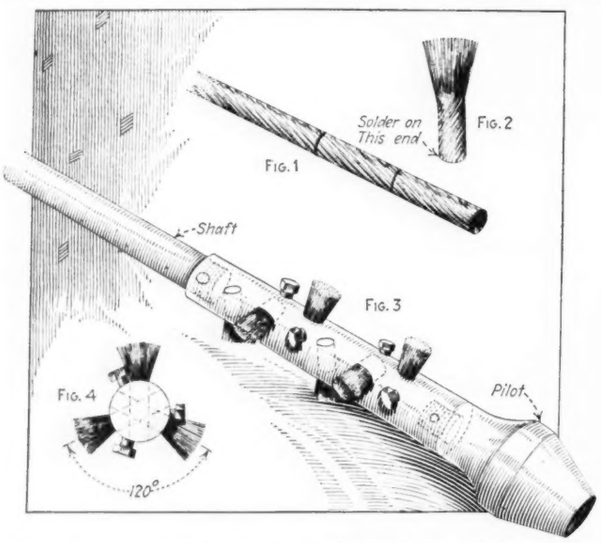
Floyd W. Parsons

IDEAS AND SUGGESTIONS

Unique and Durable Tube Brush

BY CHARLES H. WILLEY
Concord, N. H.

The tube brush shown in the accompanying illustration may seem a rather queer-looking affair, but if any of the readers could step into the boiler room of the plant with which I am connected and see a set of these homemade brushes driven by air motors, chasing out the havoc created by a week's run on "bugdust," they



FIGS. 1 TO 4. DETAILS OF A HOMEMADE TUBE BRUSH

would get busy and make up a few of them for their own use.

The idea for these brushes came to me after I had consumed many dollars' worth of standard spiral tube brushes. I had searched the advertising pages of several trade papers for some sort of a tube or flue brush that would permit the renewal of the wire fagots, but none could be found. So I set out to make such a brush. The wire used was some $\frac{3}{8}$-in. eight-strand cable from the scrap heap.

A length of this wire was soldered at points $2\frac{1}{2}$ in. apart, as indicated in Fig. 1, and then cut into short lengths. Then in a piece of round bar stock (Fig. 3), $1\frac{1}{4}$-in. in diameter, a series of holes was drilled at 120-deg. angles along the piece and into these were inserted the short lengths of cable. The soldered ends, as indicated in Fig. 3, assisted in this insertion. Each piece was secured in its hole by a set screw, as shown. The large pilot was screwed onto the end of the brush, thus making it easy to enter the brush into the tubes. The other end of the brush head is provided with a shaft whereby the device is revolved.

In use the brushes are pushed through the tube while revolving to the right, and then the air motor is reversed and the brushes pulled back while turning to the left. This not only keeps the brushes from laying one way and gives them longer life, but it results in a better cleaning job. One set of brushes will last long enough to pass through and back again in 600 four-inch flues, 8 ft. long. It is then only a few minutes' work to put in new pieces of cable.

Three Different Types of Switchboard

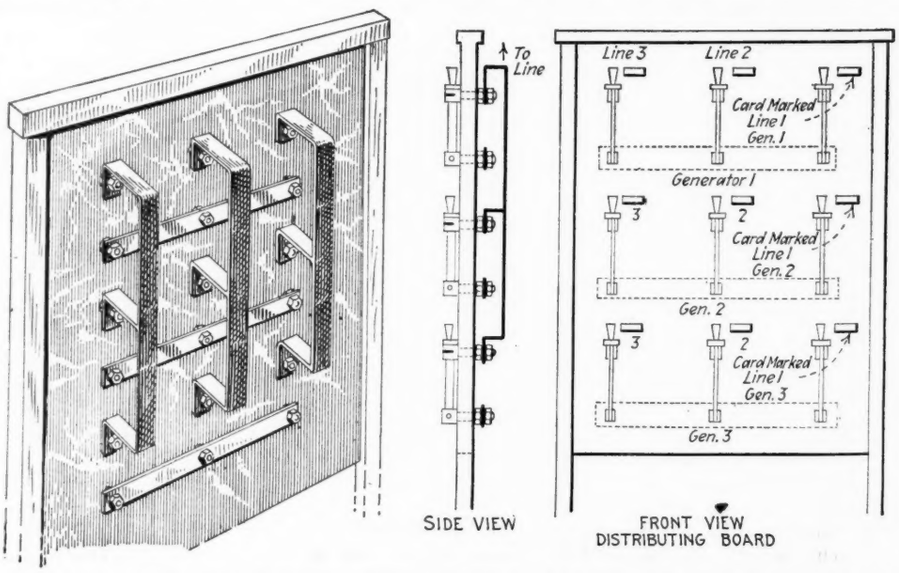
BY J. J. NOLAN
Linton, Ind.

The accompanying illustrations show three different makes of switch boards installed in one plant. This makes it inconvenient to install bus bars on account of the wide difference in the location of the studs on the rear of the boards as will be seen.

Seven hundred and fifty thousand circular mil, stranded, covered cable was substituted with terminal lugs in place. The station where these boards are installed supplies current to three different points as shown by the top of the distributing board.

Lines Nos. 1 and 2 furnish current to motor driven centrifugal pumps in the mine and line No. 3 supplies mine locomotives and mining machines. This line must be kept separate from the pumping load because short circuits would be injurious to motors and pumps.

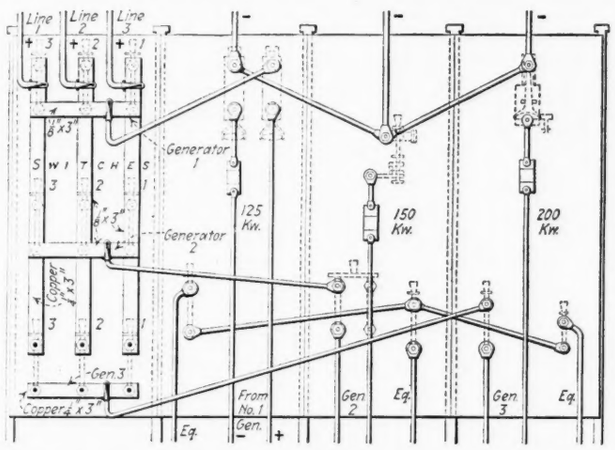
The distributing board shown is of original design and was intended to prevent mistakes in throwing in



SIDE AND FRONT VIEWS OF THE DISTRIBUTING BOARD FOR THREE GENERATORS

switches when changing over from one unit to another, paralleling, etc. As will be noticed any one of the generators can be connected to either Nos. 1, 2 or 3 line separately, either two or three paralleled on one line or all three lines as needed while in case of breakdown any line can be operated from any unit. The parallel connections are of course placed on the distributing board.

For example, suppose No. 3 generator was supplying current to No. 1 and No. 2 lines, No. 2 and No. 3 switch on lower row would of course be closed and it was desired to put No 2 generator on this load and close down No. 3 generator without stopping the motors. After building up voltage on No. 2 generator close



REVISED LAYOUT OF GENERATOR CONNECTIONS

No. 2 and No. 3 switches on the distributing board in middle row, close breaker and double pole switch of No. 2 generator (this parallels the two), trip breaker and pull single pole knife switch on No. 3 generator (this separates them), then pull No. 2 and No. 3 switch on lower row of distributing board. In this operation it is hardly necessary to use the equalizing switches.

This arrangement makes a handy but simply arranged layout in both front and rear of the board and has more than paid for the expense incurred in its installation through preventing mistakes which might have occurred damaging the equipment.

Alarm in Case of Mine Fire

As soon as word of a mine fire or an explosion is received, an alarm should be given and assistance summoned by an official or employee of the mine. In case of fire within the mine or in the entrances, the alarm should be sent immediately to all parts of the mine in order that the men may escape, and efforts be made at once to put out or control the fire. In case of an explosion, aid will necessarily be needed. All employees not engaged within the mine should be hastily summoned to appear near the mine entrance, and help should be asked from near-by mines. The call for assistance should be for mine foremen, firebosses, electricians, mechanics, hoisting engineers and timber and brattice men. Reliable men should be stationed at once at all entrances to prevent any but safety or electric lamps being taken into the mine and to make a written list of all who enter.—*Rescue and Recovery Operations in Mines.*

Fire Cleaning and the Tools Therefor

By Jack L. Ball
Amsterdam, Ohio

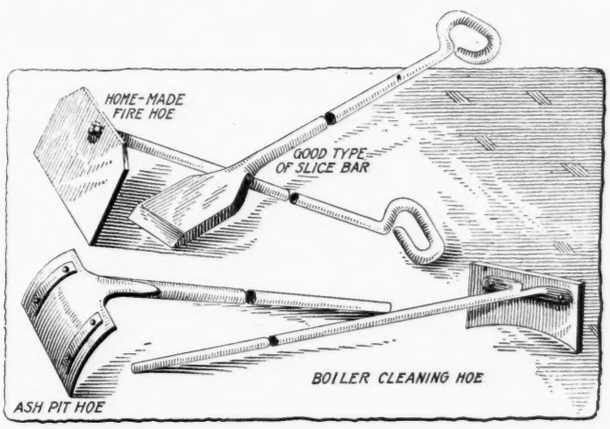
When the length of the grate bars of a boiler furnace is not over 6 ft., the quickest and easiest way of cleaning fires is to push the live coals back to the bridgewall, pull out the ashes in front, pull the fire forward and then clean the back of the grate. The method of "kicking" over one side at a time is uneconomical for these reasons: It is necessary to have one fire door open while cleaning, thus allowing great quantities of cold air to enter the furnace; it requires a longer time to clean; and it will be noticed that when a fire is "kicked" over a large amount of pit ashes is the result.

If the method of pushing the fire back is used, the following advantages will be noticed: The time required to clean fires is reduced to a minimum; the fire doors can be kept nearly closed while pushing back the fire, thus preventing a large amount of air from entering the furnace; also, the fireman is not exposed to the heat to any great extent. It is true that a small amount of ash will be pulled over with the fire, but the quantity will be small if a little care is exercised.

The handle of a fire hoe usually breaks near the blade, at which place the handle is usually welded. If the hoe is drilled and tapped, and the handle threaded, the blade can be securely fastened to the handle with check nuts, as shown in the accompanying illustration. This method insures a quick repair if repair is necessary, and will save the blacksmith the task of welding and riveting.

A good slice bar is shown below. It will be found to be an excellent tool for freeing clinkers from the grate bars; also, it is effective when used for "spudding" loose the clinkers that adhere to the furnace walls.

For cleaning ash pits, the ash-pit hoe shown was



HANDY TOOLS FOR CLEANING BOILER FIRES

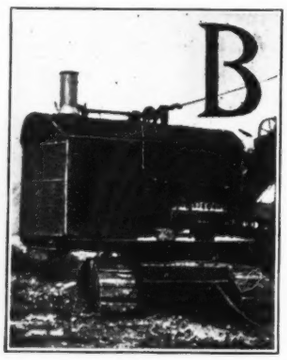
made from a discarded No. 2 coal shoved. This was bent and braced as shown and provided with a long handle. It is surprising how quickly and easily an ash pit can be cleaned with this homemade tool.

If horizontal return tubular boilers are fed through the front head, it will be noticed that much loose scale will be deposited at or near the blowoff connection of the boiler. It is often necessary to clean a "hot" boiler. As it is impossible for a man to get into it for the purpose of removing this scale, the boiler-cleaning hoe shown will come in handy for pulling this scale to the front end of the boiler so that it can be removed.

Machinery Used in the Stripping of Coal

By S. B. Creamer
Cambridge, Ohio

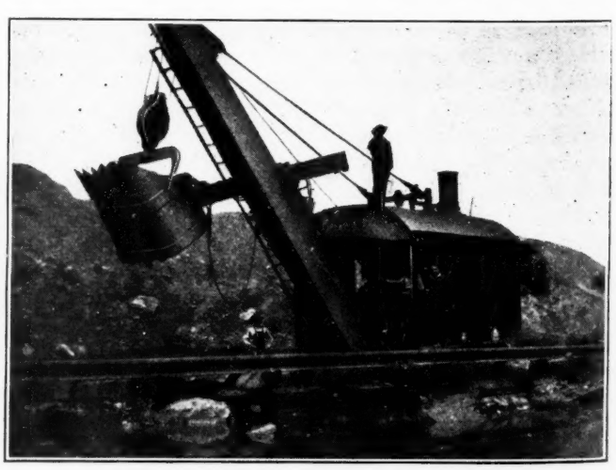
SYNOPSIS — *Describes stripping practice in Ohio as regards the types of machines used both to strip the coal and load it into cars. The comparative advantages of steam and electrically driven shovels are noted. The latter are gaining in favor wherever electric power is readily obtainable. The recovery of coal by the open-pit method of mining and the loading of it into cars by a power shovel, introduce more careful preparation in the tipple where impurities are removed.*



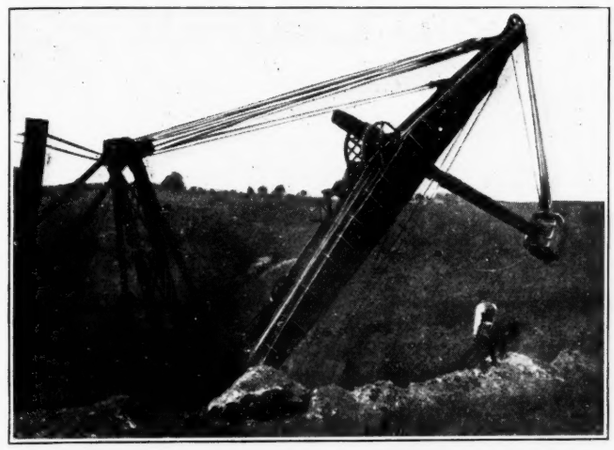
BOTH steam and electrically driven shovels are used in the stripping of coal. These shovels are massive machines of the revolving type, weighing approximately 350 tons with 80 to 90-ft. booms; they dig a cut 100 to 125 ft. wide and place dirt 145 to 165 ft. from the digging face. A 1⅛- to 1¼-in. wire cable 365 ft. long is used on the hoist. This rope has an average life of from one to six months, depending upon the nature of the material dug and the running time. The shovels are carried on four sets of narrow-gage trucks—one set under each corner—and these run on two tracks 25 ft. between centers. Each type has its advantages, but much depends upon local conditions in determining the power to be used. The steam machine has had a preference. However, the electric type is gaining in favor.

There are many advantages in the use of electric power on shovels, and where it is cheap and reliable it is rapidly coming into use. There is much less vibration in a rotary electric motor than in a reciprocating steam engine, and the reduction of vibrations, due to various causes, not only reduces the amount of repairs but prolongs the life of the machine. With the electrically operated shovel steam lines with leaking joints are eliminated; less oil is used; a cleaner shovel is possible and delays due to cleaning fires are done away with. This delay is unnecessary with machines having two boilers, however, as one boiler has sufficient capacity to operate the shovel. Thus the fireman can clean the fire in one boiler while the shovel runs on steam from the other. Some may say that the cold air drawn in by the exhaust is injurious to the flues, but this can easily be prevented by the three-way valve in the exhaust line which turns the entire exhaust into either stack or both as desired. When boilers are used ashes are deposited on the coal. This dirt is eliminated when electricity is the motive power on the shovel; in the latter case expensive water supply and frozen pipelines are done away with, and labor is reduced to a minimum. Five to six men compose a machine crew on the electric shovel—a runner, a craneman, an oiler and three pitmen. The craneman often is omitted. Compare this with eight men on the steam machine; this crew includes a runner, craneman, oiler and fireman, with four men in the pit. The extra man in the pit is required to keep the shovel supplied with coal. When it comes to speed, the electric shovel is practically automatically controlled and "foolproof." It is impossible to speed it up as in operating the steam machine. When there is an overload, as there often is in pulling heavy stones, an increase in power above the capacity of the machine cannot be provided for at the electric control, as is often done at the steam throttle. The manufacturers arrange for a fuse to burn out instead. This prevention of an excess overload may save thousands of dollars on repairs and shovel upkeep, as well as add life to the cable. Ashes are not dumped on the coal and trenches are not dug in it, as is done when obtaining fuel for use on the steam shovel; these trenches frequently make extra trackwork. Some insist that it is unnecessary to dump ashes on the coal, but this is hard to prevent entirely. Six and 8-cu.yd. buckets are used on these shovels. However, the use of a 5- or 6-cu.yd. bucket is to be preferred over the 8-yd. bucket, on account of less strain. Yet with all the advantages of the electric shovel, the reliability and flexibility of the steam machines give them much prestige. With a supply of coal and water they can operate regardless of location.

The shovel used to load the coal is a much smaller machine than the stripping shovel; it is also of the revolving type. Shovels with booms from 28 to 32 ft. in length give the best satisfaction. The most valuable asset of this type of machine is the caterpillar tractor, which completely eliminates the use of pontoons and makes possible its operation with one pitman. On these small machines steam power has many advantages over the electric drive. While the large electric shovel is a machine run by three motors, the small one is operated by only one motor. The hoist, crowding and swinging mechanisms are operated by friction drives from this one motor, making impossible the "speeding up" of the machine while loading trains, as is possible with steam shovels. These shovels being small, it is easy to



STEAM SHOVEL USED TO LOAD STRIPPING COAL



STRIPPING COAL BY SHOVEL IN OHIO

increase their speed, and each minute saved in loading trains means cheaper production. On the other hand, only two men are required on the electric machine, the runner and pitman, while three men are required on the steam machine—a fireman being necessary.

The great advantage with the steam coal-loading machine, as with the "stripper," is its great flexibility. With the aid of a team to haul coal and water, and an extra man to help with the caterpillars, the shovel can be moved a distance of two miles in 10 to 16 hours. This, of course, depends upon the topography of the land. Such a move would be impossible with an electric machine, as the cost of power transmission would be prohibitive. These shovels can climb a 20 to 30 per cent. grade, but they must be moved straight up or down the hill. If an attempt is made to follow the contour of the hill, trouble is encountered by the trucks jumping the caterpillar belts. The only objection to the steam loading shovel is the leaking of flues in the vertical boiler. Much of this leakage is caused by mud on the flue sheet, which can be prevented by cutting out two or three flues every four or six weeks and "washing out" with water under high pressure. There are some objections to this, but they are negligible in comparison with the results obtained.

The haulage equipment depends largely on the plant layout. If coal is loaded directly into standard-gage cars, which is quite undesirable, one standard-gage 50-ton dinkey will serve one loading shovel. The big objections to loading directly into railroad cars are the lack of opportunity to clean the coal and the heavy track required. Then, too, it is often impossible to build a track from the railroad switch to the grade of the coal. Where the plant layout calls for a tipple, contractors' narrow-gage equipment is the most satisfactory to use. With two 14- to 18-ton dinkeys each hauling 15 four-yard dump cars, a loading shovel can be served at a distance of two miles from the tipple. An extra haulage unit of one dinkey and 15 cars should be kept in condition for use in any emergency that may arise.

The use of a tipple on a stripping plant is almost a necessity in the preparation of coal. Even with great care on the part of the shovel runner, bottom rock is occasionally loaded. Through the use of the tipple and picking table all impurities can be removed.

The increased use of automatic stokers in power plants makes a crushing unit most desirable, and an up-to-date tipple must include a picking table, crusher and slack conveyor. Each piece of apparatus should be equipped with an individual power drive, for should it be necessary to stop the picking table, in order to remove rock, the crusher can be run until emptied. In this way the crusher is not choked nor is it necessary to start it while loaded. The same is true of the slack conveyor.

Pit drainage is important as it is not always possible to obtain natural drainage. This makes necessary the use of pumps. In the choice of pumps there are three factors to be considered—capacity, portability and power. The capacity of the pump is quite important and it should be large. For instance, let us suppose we have a dry pit with the loading shovel descending a dip. A heavy rain falls during the night or early morning, which floods the loading pit. A man comes out with a team one or two hours before starting time, pulls a pump into the pit and has it dry by the time work should begin, or shortly after. This makes possible a full day's run, while if only a small pump is available one or two days' loading is lost because of the wet pit A portable centrifugal pump with a 4-in. suction and 3-in. discharge working against an 80-ft. head has given satisfactory service. This pump was driven by a 15-hp. gasoline engine with a chain drive and friction clutch. A gasoline engine, while a little troublesome at times, is convenient; and with a good gas-engine man on the job is fairly dependable.

The water supply, while one of the most important factors in steam plants, is generally given the least consideration. An undersized pump, with a 2-in. discharge, is generally hastily installed for the stripping shovel. As the shovel travels, the increased pipe friction and the addition of a loading shovel and dinkeys soon overload the pump and a shortage of water is the result. To close down a plant for lack of water because of low-capacity pumps and an undersized pipe line is not only expensive and inefficient management, but it is discouraging and exasperating to the man in charge as well as demoralizing to the working organization. On any stripping work, of one unit, a pump should have a capacity of not less than 60 gal. per min., and two pumps should be installed. Nothing less than a 3-in. pipe line, well buried below freezing, should be laid.

Flooded Coal Mines in Great Britain

The possibility that the Black Country mines will become totally submerged by the rising water has become a matter of grave concern in Great Britain, especially in view of the millions of tons of mineral that will be lost to the nation. In consequence of the heavy rainfall in the last few months and the inadequacy of the pumping machinery following serious breakdowns, a number of collieries were flooded, and it was intimated that several others will be unable to continue operations. Most of the pits in the Tipton district are working short handed, and the longer roads from the shafts have been abandoned. The colliery proprietors are urging government assistance to free the mines of water, but it is feared that any efforts made in this direction will now be too late. The miners' federation, at the request of the local association, is bringing pressure to bear on the coal controller, and local members of parliament are being urged to use their influence. The district has never before been faced with such a dismal outlook so far as the coal supply is concerned.

Preparation of Bituminous Coal—II

By Ernst Prochaska
Benton, Illinois

SYNOPSIS—*The water used in coal washeries must ordinarily be clarified before it is either allowed to run to waste or used for washing again. Various means have been tried for this purpose with varying degrees of success. One important adjunct of all coal washeries should be a raw-coal storage bin. This should be of sufficient capacity to hold one day's supply of coal. Suitable elevators or conveyors must be provided for placing the coal in storage and removing it therefrom.*

THE methods used for the clarification of the wash water and for sludge recovery at washeries have the combined purpose of using the sludge otherwise carried away with the outflowing wash water and of obtaining sufficiently clear wash water to be used over again. The wash water must be cleared to such an extent that a continuous circulation can be carried on, as the use of fresh water, on account of the great quantities required, would increase the cost of washing to a considerable extent. Theoretically the process of clarification should be carried on in such a way that only sufficient fresh water will be required to make up for the loss of water carried away with the washed coal and the refuse, and also that lost by evaporation and leakages.

The methods of water clarification depend entirely upon the nature of the raw coal. Friable coal which shatters in crushing and which contains a great amount of fireclay will require more extensive and carefully designed clarification plants than a raw coal which does not break up quite so fine and which is freer of fireclay.

The oldest and simplest means of clarifying water consisted of large settling ponds in which the sludge was permitted to settle. After one pond was filled up with sludge a new one was installed or the walls of the first one were built up higher. These settling ponds, however, required immense ground space and later on two clearing basins were installed which were used intermittently. If the first basin became filled, the water was run into the second and the sludge removed from the first.

Did Away With Removal of Sludge by Hand

This arrangement, however, required the removal of the sludge by hand. Further improvements were sought by the use of *Spitzkasten*, which permitted a continuous operation. The sludge was withdrawn from the apex of the *Spitzkasten* and carried in a sluiceway to a settling tank out of which the sludge was conveyed by means of a dewatering elevator to the fine-coal bins. The outflow of the sludge from the *Spitzkasten* was regulated by a valve or cock and was hardly ever continuous.

In some installations the *Spitzkasten* were consolidated into one large settling cone similar to the Callow tanks used in ore dressing. One of the first and best arrangements of this kind is the Ramsay sludge recovery tank used in connection with the Robinson washers. To make the process of sludge recovery still more automatic and continuous, narrow and long settling tanks were installed in which slow-moving scraper conveyors or even screw conveyors collected the sludge which had settled out on the bottom of the tank. On the end opposite to the inlet of the dirty water the bottom of the tank was depressed to form a sludge pit or sump out of which an elevator carried the sludge to the fine-coal bins.

None of the installations described in the foregoing brought about a sufficiently perfect clarification of the wash water. The moving conveyors disturbed the body of the water too much to permit perfect settling; the water overflowed too rapidly to drop all of the fine particles and the resulting sludge was too liquid to be used advantageously without further dewatering. The question of an efficient way of handling and preparing the sludge is still far from being solved in a satisfactory manner.

Dorr Thickeners Clear Water Satisfactorily

The most modern type of sludge recovery and water clarification apparatus—one that promises to become an important part of any coal washery—has been borrowed from the ore-dressing plants where it has been used satisfactorily for many years. The use of Dorr classifiers for the coarse sludge and of Dorr thickeners for the fine pulp is coming into favor, and the experience gained with a few existing plants has shown encouraging results. The Dorr thickeners, if properly installed, do clear the water satisfactorily; and the resulting sludge, even if too liquid to be used without further treatment, is removed continuously and automatically in a simple and economical manner.

The theory of the Dorr thickener is based upon correct principles. The dirty water enters the apparatus at the center and the clear water overflows at the periphery. The sludge settles on the bottom of the circular tank and is carried toward the center discharge in the bottom of the tank by means of slow-moving scrapers. These scrapers being located near the bottom of the tank do not in any way disturb the surface of the water, therefore they do not interfere with the settling out of the sludge. The proportion of solids to liquid in the sludge is only limited by the ability of the pumps to carry away the sludge. In actual practice sludge has been made having 56 per cent. of solids to 44 per cent. of liquid. This sludge is dry enough to be mixed with the dried coal coming from the washer.

Little has been accomplished in treating the sludge succesfully; in fact few people have taken this problem in hand. Some washeries spray the sludge while on shaking screens with fresh water, but this is merely done to wash off the adhering fireclay. In most washeries the sludge if recovered at all is mixed in with the washed fine coal without further treatment. Otherwise it is simply thrown away on the refuse dump.

The most feasible way of treating the sludge would be to dewater it on continuous drum-type filters, and if low enough in ash and sulphur mix it with the washed

coal; or if too high in impurities to permit this, to treat the sludge on slime tables.

The sludge disposal is the final process in coal washing. In regard to the general arrangement of a coal washery it must be stated as important that it has always been considered advantageous to eliminate as far as possible all mechanical means for conveying the materials from one unit to the next. The different units should be arranged in such a way that by gravity only, or by the use of the wash water, the materials can be moved through the whole washing plant.

Where washeries are located on level ground this is only partly possible and elevators and conveyors must be installed. In the early washeries the mistake was made of spreading them out in a horizontal direction and installing between each unit a separate elevating device. This necessitated a great number of individual drives, requiring constant repairs, a great number of spare parts and consumed excessive power. For this reason the modern washeries are built with the units arranged vertically, thereby concentrating all elevating machinery at the incoming end of the plant. This simplifies the machinery, condensing it into a few heavy but carefully designed elevators, driven by large motors that can be operated with a higher efficiency than a great number of smaller ones.

Reasons for Installing a Raw-Coal Bin

A raw-coal storage bin by all means should be included in every coal washery, and this should be made as large as possible for the following reasons:

1. Every interruption in hoisting coal will stop the washery if a certain reserve cannot be supplied during such periods.

2. The foregoing holds true for an interruption in the operation of the screening plant.

3. If the operation of the washery is interrupted, the presence of a raw-coal storage bin will permit the screening plant to be run until the raw-coal bin has been filled. Otherwise the screening plant must be shut down and in connection therewith the hoisting of coal must cease and the working of the whole mine must be stopped.

4. A coal mine does not deliver the coal regularly during the whole day. In the morning the hoisting is rather slow and speeds up until the middle of the day. It is apt to slow down toward the evening. For the proper operation of a washery a regular supply of coal is of the greatest importance. A good sized raw-coal bin permits drawing off of some coal left over from the preceding day during the period of slow hoisting and the filling up of the bin when more coal is hoisted than the washery can handle.

5. If on account of heavier hoisting than figured upon or on account of insufficient capacity of the washery more coal is mined than the washery can take, a large raw-coal bin will make it possible for the washery to consume the daily output of the mine by working overtime.

In consideration of the reasons just enumerated, the raw-coal storage bin demands the fullest consideration as it is an important equalizer between the mine, the screening plant and the washery. If it is not possible to build a sufficiently large bin between the screening plant and the washery, it will become necessary to build one or more reserve bins at some convenient place. Conveyors must be installed to carry the coal between these bins and from them to the washery. The different units between the screening plant and washery are the conveyors from the screening plant to the storage bin, the storage bin proper and the conveying system from the bin to the washery.

Location of the Raw-Coal Storage Bin

To arrive at the proper arrangement of the different units it is necessary to form a correct idea of the most advantageous location and elevation between the screening plant and the washery. The following facts must be considered:

The elevation of the screening plant is fixed by the elevation of the railroad track in the loading yard under the tipple. To load the coal directly from the screens into the railroad cars in the most efficient manner the coal should neither be elevated by separate machinery nor should it drop from too high a point. The elevation of the rails under the tipple are the base from which the elevation of the screening plant must be determined. In a screening plant the use of elevators can be easily avoided, but in a washery conditions are different. The coal must pass over a number of different pieces of apparatus and elevators cannot be entirely avoided.

It has been previously stated that modern washeries are designed with the point in view of avoiding as far as possible the use of numerous small elevators and to place the first units of a washery at such a height that the materials can be conveyed either by gravity or in sluiceways with water through the whole plant. On account of this method of construction it becomes necessary to elevate the raw coal from the screening plant to the washery at a considerable height.

Because the raw coal travels from the screening plant to the washery by way of the raw-coal bin it will be necessary to determine how this bin can be located to the best advantage and so as to make the carrying of the coal as economical and efficient as possible. A raw-coal bin of even a few hundred tons capacity requires a heavy supporting structure and therefore it should not be located any higher than absolutely necessary. The conclusion is thus reached that the heaviest elevating should not be done between the screening plant and the bin but between the bin and the washery.

Storage Bin Should Be Close to Washery

Some designs do not show a proper bin at all but only an arrangement to deposit the raw coal on the ground, with maybe a low retaining wall on both sides to keep the coal from spreading too far. These walls can also be used to support the loading conveyors. The coal is recovered from this pile by a conveyor running in an underground tunnel. For the elevation of great quantities and the required uniform delivery steep bucket elevators have proved themselves especially well adapted. Skip hoists cannot be considered, because the delivery is irregular and intermittent.

For these reasons it is advantageous to locate the raw-coal bin close up against the washery at the ground level. If we now consider that the coal is delivered from the screens at a slight elevation above the track level, and that the top of the raw-coal bin, on account of its required large capacity, is at a much higher elevation, a normal arrangement of the units between the screening plant and the washery will be as follows: Elevating or conveying machinery to overcome slight differences in height between the screening plant and

the raw-coal storage bin and elevators to overcome a considerable difference in height for feeding the washery from this bin.

Scraper conveyors are well adapted for medium grades and short distances. Their construction is simple and they have large capacity with relatively small power consumption. Belt conveyors are also advisable because they carry the smaller sizes of screened coal efficiently. The question to be solved is, which of these two types of conveyors fulfills the conditions to the best advantage?

Belt conveyors are theoretically well adapted for this purpose. The delivery chutes from the screens deposit the coal upon the belts in the best possible manner. The hoppers under the screens act as equalizers and permit uniform loading of the belts. The discharge of coal from the belt into the bin is carried on easily and the coal is transported without degradation. But on the other hand belt conveyors are rather expensive and the belts require frequent renewals.

Scraper conveyors are comparatively cheap, quite durable, and the separate parts can be easily and cheaply replaced so that they are better adapted for rough treatment. But they grind up the coal so that the choice between the two types of conveyors depends a great deal upon the nature and size of the material to be conveyed. Soft friable coals require belt conveyors, especially if the small sizes are of little value. To a hard coal that does not shatter much or to a coking coal where fines are not objectionable, scraper conveyors will be better adapted. But the scraper conveyors use more power than the belt conveyors so that the cost of energy is another consideration that must be taken into account in making the proper selection of the most economical type of conveyor.

Conveyors Transport Material Through Washery

Scraper or belt conveyors are not only used for the filling of the raw-coal bin but are also employed for the conveyance of the different materials through the washery, and especially for the filling of the washed coal bins, which are usually arranged in a series of separate bins set in a row. To fill these bins by means of scraper conveyors it is only necessary to put in openings provided with sliding gates in the bottom of the conveyor trough, at the proper points.

Belt conveyors can be easily equipped with trippers, which will permit the discharge of the coal at any point, or fixed discharge stations can be built into the conveyor. The trippers can be either hand-operated or they can be made automatic and self-reversing. By locating movable stops on the track rails the coal can be discharged either over the whole length of the bin or over any part of it. For bins which are located at right angles to the general flow of material, shuttle conveyors can also be used to advantage.

Which one of the arrangements should be employed depends entirely on the type of the bin. Generally speaking, belt conveyors on account of their light weight and their adaptability to almost any condition are to be used for long distances and for fine coal if it is not too wet. For coarse and wet coal and for short distances scraper conveyors are to be preferred. For short horizontal conveying, shaking conveyors of the Marcus or Zimmer type can also be used to great advantage.

If the raw-coal bin is included within the main washery building the same material is used in the construction of both units. This is either timber, steel or reinforced concrete; in some rare cases, cast iron. Raw-coal bins are built either rectangular or round. Rectangular bins are more expensive in construction but have a greater capacity per square foot of ground space occupied than have circular bins. Rectangular bins permit also a more perfect arrangement for loading and unloading apparatus than do round ones, especially if the necessary capacity increases.

The capacity of the raw-coal bin depends upon the output of the mine and should be at least as large as the daily production. Bins with a capacity of 4000 tons have been constructed and some of the latest designs show bins with 6000 tons capacity.

The mechanical appliances for supplying the washery with raw coal are of the greatest importance. The continuous and regular operation of the washery depends entirely on a steady coal supply; therefore, the strictest specifications should be applied for the design and construction of these appliances.

The capacity must be fully equal to that of the washery. It must be considered that elevators handling large tonnages require large, heavy buckets. On account of the size of the weights to be hoisted and the height to which the coal must be elevated, failures of the chain are disastrous and repairs become difficult and take up much time. For this reason it is preferred to use in large plants two elevators.

Importance of Reliable Elevator Operation

On the other hand the general arrangement and the space available permit the installation of only one raw-coal bin. This makes the installation of more than two elevators almost impossible on account of the lack of room at the bottom of the bins. The conditions at the discharge end of the elevators are similar.

As a usual thing only one unit is provided to receive the raw coal, and economic reasons demand the concentration of the flow of coal through the washery. Therefore we must seek absolutely reliable operation of the elevators. This can only be obtained by using the best of materials, by ample dimensions of the carrying members and by the best workmanship. First cost cannot be considered if we take into account the increase in cost of operation caused by repairs and interruptions.

But even with all these precautions it is advisable, whenever possible, to have a complete spare elevator on hand. In case of a wreck or a collapse of an elevator repairs take a long time, and for this reason a spare elevator ought to be in place for immediate use.

If these precautions are required for continuous operation, there remains still the necessity for a regular and uniform supply. This is of the utmost importance for the efficient working of a washery. On account of the existing conditions, which require the elevating of coarse-grained material at a steep angle to a considerable height, absolutely continuous discharge can hardly be accomplished. But the continuous bucket elevator comes nearer to fulfilling the conditions than any other apparatus.

Bucket elevators are used in coal washeries for various purposes. The most important of these are the following: Supplying the washery with raw coal; dewatering the washed coal and elevating it into the washed coal bins; supplying the rewash jigs; dewatering the sludge; dewatering the secondary product (boiler house coal) and elevating it to the boiler house

coal bin; dewatering the refuse and elevating it into the refuse bin.

The design and construction of elevators depend upon the material to be handled. Most of the elevators are constructed with a two-strand steel-link chain. The chain links and the connecting bolts and rods ought to be fabricated out of the best medium carbon machinery steel. Small elevators have flat links, but for heavy elevators links with upset ends are to be preferred. Under ordinary conditions and for dewatering elevators, buckets are fastened to the chain at every other link. For raw-coal elevators buckets are provided at every link, making it a continuous bucket elevator.

Buckets are made from steel plates, securely riveted to the end plates and provided at the top edges with stiffening bands. Wide buckets have also a stiffener in the middle to prevent bulging out of the sides. The ends of the buckets are fastened to the sides with angle iron or, in some instances, the ends are made of malleable iron. Malleable-iron buckets or those pressed from one piece of steel plate are seldom used. Dewatering elevators have buckets with sides and ends made out of perforated plates. The size of the perforation must be in proportion to the size of the coal handled.

The elevator chains at the top are carried over sprocket wheels or head drums. On the lower end foot drums are universally used. Square, hexagon and octagon drums are employed, depending on the pitch of the chain links. Octagon drums can be used with short pitch chain, whereas those of long pitch require square drums. The pitch of the chain links varies from 8 to 18 inches.

Mechanical Details Are Important

The take-ups are generally placed at the foot of the elevator and only on small elevators are the take-ups placed at the top. Head and foot drums are either made of steel or have steel wearing plates. The chains are guided between angle irons which ought to be protected by wearing plates. To prevent a reverse or running-down motion of the elevator in case of a break, holdbacks are sometimes used.

Elevators are usually driven through a train of gears or by a sprocket or silent chain drive. Belt drives should not be used on account of the danger of slipping. The gear wheels should be of steel while for heavy elevators manganese steel gears ought to be specified.

The framework supporting the chains may be made of steel for the raw-coal elevators, but for dewatering elevators timber frames are to be preferred. The head and jack shafts ought not to be supported on the elevator frames, but on a separate supporting structure. This is advisable in order to facilitate repairs and to keep the gears in better alignment. The size of the bucket elevators varies considerably. The elevators for heavy tonnage are massive and heavy, and must therefore run slowly in order to prevent rapid wear. Dewatering elevators also must operate at a slow speed to permit the draining out of the water before the buckets reach the discharge point.

Dewatering elevators must be inclined to such a degree that the water running out of one bucket will not drip into the one next lower. Raw-coal elevators could be installed vertically, but this arrangement would require too much room at the head as well as at the foot end. The inclination of a raw-coal elevator depends entirely upon the room available. The speed of raw-coal elevators ought not to exceed 100 ft. per minute while dewatering elevators should not be run faster than from 50 to 60 ft. per minute. The maximum capacity of elevators in coal washeries is about 200 tons per hour.

(*To be continued*)

Legal Department

Exclusive Sales Agencies—A contract by a coal-producing company granting another company an exclusive agency for the sale of its output impliedly binds the agent corporation to dispose of its entire output so far as reasonable effort permits. (Kentucky Court of Appeals, Cassidy Coal Co. vs. North Fork Coal Co., 208 Southwestern Reporter, 769.)

Mine Engine as Part of Realty—Where a mining company installed on mining property owned by it an engine weighing 25,000 lb., with a flywheel 12 ft. in diameter, and embedded in a heavy concrete foundation, the engine passed under a subsequent deed of the real estate, as a part thereof, there being no attempted reservation of title to it in the deed. (Alabama Court of Appeals, Lewis vs. Mable, 80 Southern Reporter, 690.)

Pennsylvania Workmen's Compensation Act—A miner dying from inhalation of noxious gases in a mine while obtaining tools is to be regarded as having died from an accident occurring in the course of his employment, entitling his dependent relatives to an award under the Pennsylvania Workmen's Compensation Act, although he had been warned against going to that part of the mine. (Pennsylvania Supreme Court, Gurski vs. Susquehanna Coal Co., 104 Atlantic Reporter, 801.)

Mining Lessee's Timber Rights—A lease of coal lands, granting to the lessee the right to such trees not more than twenty inches in diameter one foot above the ground as might be needed in mining operations, should be construed as applying the diameter limit to the time of cutting, and not as authorizing cutting of trees of that size at the time the lease was made but exceeding the twenty-inch limit at the time of cutting. (West Virginia Supreme Court of Appeals, Raleigh Coal and Coke Co. vs. Mankin, 97 Southeastern Reporter, 299.)

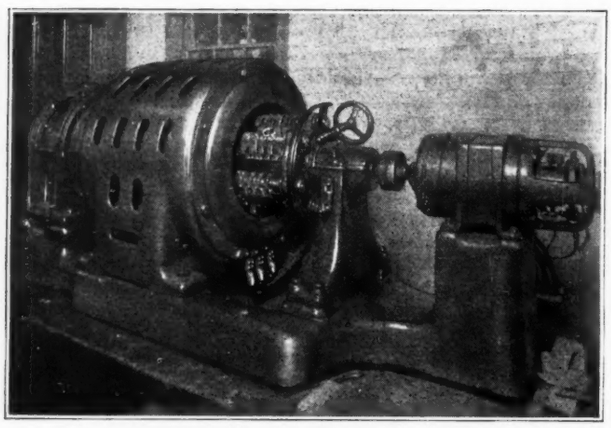
No Liability for Injury to Employee—A mine tracklayer stepped in between two motors to obtain a drink of water from a bucket on one end of one of the motors, although he could have safely and conveniently stood at one side in a clearance way. Not knowing of this man's presence between the motors, one of the motormen attempted to move his motor, but when the brakes were released it rolled back toward the other motor, for want of contact with the trolley wire, and the tracklayer was crushed between the motors and killed. Held, that the mine operator is not liable; there being no actionable negligence through failure to take proper precautions for the safety of decedent. (Kentucky Court of Appeals, Komonyi vs. Consolidation Coal Co., 206 Southwestern Reporter, 883.)

Rights of Coal Corporation Stockholders—An entryman on public coal lands, being unable to pay the price required by the Government, induced three other persons to organize a corporation, to which it was proposed to transfer the entries in exchange for stock. It was agreed as to the proportions in which the stock was to be distributed. Held, that other stockholders cannot recover from the three promoters on the theory of an improper stock distribution to the latter, where the transaction resulted in a profit to the corporation, and all the stock was worth at least par by reason of the lands so conveyed to the company. It is immaterial that the promoters may have reaped greater profits than other purchasers of shares in the corporation. (Utah Supreme Court, Robertson vs. Draney, 178 Pacific Reporter, 35.)

Coal Mine Ventilation Motors*

By H. W. Chadbourne
Schenectady, N. Y.

IN COAL mining it is necessary to keep all passage-ways and working places in a healthful and safe condition for work. To accomplish this there must be maintained a circulation of fresh air that will dilute, render harmless, and sweep away the noxious gas produced by the breathing of man and animals, the burning of lamps, the condensation of powder smoke, the decay of timber and other organic matter, the gases occluded from the coal faces and the fine coal and slack. Also, if gasoline mine locomotives are used, their exhaust contains additional gases to be diluted and swept away. Not only is the oxygen of the air consumed in the operations performed in a mine, but a portion is also absorbed by the freshly exposed faces of coal.



REGULATING SET FOR MINE FAN MOTOR

There is always an unequal pressure on the air in a mine. This is caused by the difference in temperature of the air inside and outside the mine. This pressure forces air through the passages and workings. The volume of air passing through the mine varies directly with the pressure and inversely with the resistance of the air passages.

Although this method may be suitable for small non-gaseous mines, it is rarely used. Some of the objections to its utilization are that the air pressure varies with the external air temperature. The direction of pressure may be reversed from winter to summer and at intermediate times the pressure will be light or even non-existent, and may vary with the force or direction of the wind. The amount of this natural pressure can be calculated for any given difference of air temperatures, and thus the volume of air at any time be determined.

A furnace is sometimes used to raise the temperature of the up-cast air so that it will be lighter than the down-cast air. This gives more pressure and insures the air always traveling in the same direction. The chief point to be considered is the correct size of furnace. This type of ventilation should not be used in gaseous mines, and in some cases it is prohibited by law.

There have been a number of mechanical methods tried for ventilating mines. Among these might be mentioned: The wind cowl by which the wind pressure on the surface is brought to bear effectively upon the mine air-ways, the waterfall, the steam jet, and the fan or blower.

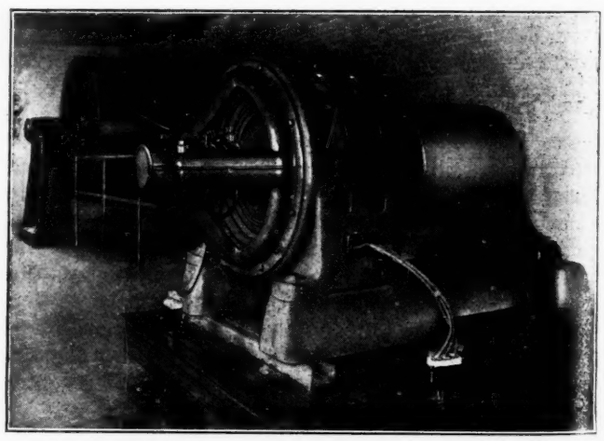
Mine ventilation fans are of two types, the disk fan and the centrifugal fan, with both of which all mining men are familiar.

The matter of fan speed is an important one. A small fan at high speed may give the same pressure and volume as a large fan at lower speed. There are, however, a number of conditions which make it desirable to have a variable-speed fan. For a given fan with a given size outlet the pressure varies nearly as the square of the speed, the volume directly as the speed, and the power required as the cube of the speed.

There are some conditions where a constant amount of air is necessary 24 hours a day all the year. For this constant-speed work, the standard induction motor is perfectly adapted. It may be remote-controlled if necessary, and requires no attention except to the oiling system; and that only at long intervals.

The choice as to whether a squirrel-cage or phase-wound rotor is used depends on the size of the motor and on the capacity of the transmission line and power service to supply the maximum peak requirements. Generally speaking, squirrel-cage motors should be employed up to about 200 hp., and phase-wound or slip-ring motors above that capacity.

When a mine is in the early stages of development only a small ventilating capacity is required, but later as the workings grow more air is necessary. Also there are times when because of falling roof or other blockades in the air passages a higher pressure is desirable with a smaller volume. Under these conditions an adjustable-speed fan is desirable and almost necessary. It is therefore the usual practice to use fans of low or moderate speeds, arranged for increased speed when required.



MOTOR DRIVING VENTILATING FAN

For adjustable-speed motors one naturally thinks first of direct current. The characteristics of a direct-current motor are well suited for adjustable-speed fans, and a large number of such installations have been made. These motors, however, require attention to the

*Abstracted from "Ventilation of Coal Mines," in *General Electric Review.*

commutators, and brushes and the transmission of direct current is not economical except for short distances. Therefore alternating-current motors are used almost entirely.

There are a number of methods for adjusting the speed of alternating-current motors. The first and simplest utilizes the standard induction motor with slip rings or phase-wound rotor and external resistance in the rotor circuit. This motor starts with a small current input and for a given resistance in the rotor circuit it runs at constant speed for a given fan load. As the fan load rarely changes except because of a change in speed, any speed or fan output desired may be obtained by varying the resistance.

The principal objection to this system is that it is inefficient. For instance, for half-speed operation, the power exerted upon the air will be the cube of ½, or 12½ per cent. of full load; but there must be dissipated an equal amount in the resistance plus the losses in the motor itself. Thus an efficiency of less than 50 per cent. is actually obtained. In spite of this low efficiency, however, a large number of these motors have been and are being installed for this class of service.

There are a variety of different dynamic regulation methods which can be employed. Under rheostatic control the energy from the rotor circuit is dissipated as heat. In the dynamic methods this energy is put back into the line. The most common of these systems is that of a regulating set. This arrangement gives exceptionally good operating characteristics, together with high efficiency and power-factor. Its only objection is the additional first cost of the set.

For fan motors of 300 hp. or less, a brush-shifting motor gives a simple, efficient and easily operated machine. This motor is started, its speed changed and even reversed by means of shifting the brushes. With a certain brush setting no torque is developed, and under this condition the motor will not start even if the line switch is closed. The brushes are shifted by a worm gear and handwheel to obtain the desired speed. This type of motor gives stable operation for fan service down to 70 per cent. below synchronism.

Cannel Coal in Texas

What is possibly the largest body of cannel coal in the United States, if not in the world, lies on the Rio Grande about 25 miles above Laredo, Tex. The outcrop of this coal can be traced for many miles in the bluffs along the river in Webb County to a point at which it swings northward into Uvalde County. The coal has been mined for many years at Santo Tomas and more recently at Darwin, or Cannel, and Dolores. It occurs in two principal beds, about 90 ft. apart, both of which are being mined. The beds range in thickness from about 2 ft. to 2 ft. 6 in., and are fairly persistent. For many years they have supplied a large part of the coal used on the railroads in southern Texas and the adjacent part of Mexico.

This coal is of geologic interest because, although it lies in rocks which elsewhere in Texas contain only lignite, it is a bituminous coal. It has the qualities of a cannel coal; it contains a large amount of volatile matter, or gas, and it yields oil by distillation—about 50 gal. of oil to the ton of coal. It contains more nitrogen than any other coal in the United States.

At most places the roof of the coal is poor and requires considerable timbering, and as no trees grow in Webb County this requirement adds considerably to the cost of mining. At each of the mines in this district there is a huge dump of clay, either removed in mining the coal or derived from the shale that forms the roof.

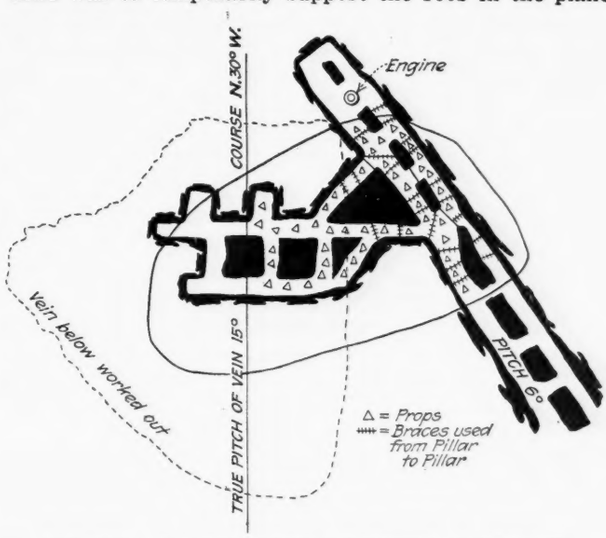
The coal of this field is described in a bulletin entitled "The Santo Tomas Cannel Coal, Webb County, Texas," by George H. Ashley, issued by the United States Geological Survey, Department of the Interior, as Bulletin 691-I.

A Sudden Mine Squeeze Arrested

By J. R. Thomas
Plymouth, Penn.

A squeeze is looked upon by mining men as a difficult problem to handle. Especially is this the case when a squeeze occurs in a bed where the seam underlying it has been worked out. The illustration shows the workings of a section of a mine where a sudden squeeze occurred, and as the bed underneath was worked out within the area shown by the dotted line, many reasons existed to support the belief that it was impossible to save the workings from caving in, or falling into the bed below.

When this squeeze was discovered the first thing done was to temporarily support the roof in the plane



SECTION OF MINE WHERE SQUEEZE OCCURRED

and plane airway with a row of substantial props. Then it was noticed that the props were getting loose, which necessitated their being recapped. It was deemed advisable, therefore, to try and support the roof from the bed beneath, but it was found that it was impossible to get into this at the proper point. The next thing done was to use good strong braces from pillar to pillar, as indicated by the small triangles in the drawing. After the first three pillars had been braced firmly, the squeeze seemed to settle a little. The braces were then used on the pillars, as shown in the sketch, and the workings allowed to stand awhile. It was noticed that the braces were taking weight, as they were bent.

After the workings had stood for a few days the work of reopening began. As the props and braces were removed, double timber of ample size was set and the bed beneath flushed to offer insurance for the prevention of a similar occurrence. The workings at present are still in operation, and everything is quiet.

Progress in Utilizing Pulverized Fuel*

SYNOPSIS—*Many reports received from users of pulverized fuel vary widely in tone, character and enthusiasm. Too much emphasis has been laid upon "heat balances" and by far too little on "cash balances."*

PULVERIZED (or powdered) coal has actively engaged attention for the past five years. Last year we all laid off from studying such things as pulverized coal to do our share in attending to the case of a combination in Central Europe that threw a monkey wrench into the gears of world progress with the idea of revamping things terrestrial to suit their particular kultur scheme. The boys went at the job so hard and earnestly that most of them have not really stopped yet.

The progress report now offered, therefore, will on account of the unusual conditions which have existed consist of a summary of some results, comments and suggestions. These are offered solely with the idea that they may bring out pertinent frank discussion and constructive criticism on an interesting engineering subject. All deeply appreciate the earnest work that has been done thus far to advance the art of burning pulverized coal by both manufacturers and those interested in effecting steam economy. There are many things about pulverized coal that we are satisfied with. There are some things that we are not satisfied with.

It is of the utmost importance that accurate analysis of this subject be made in order that progress may proceed along correct lines. The exact truth of the matter is what is wanted, as no one is so badly fooled as he who fools himself. And now, on the eve of a new advance in world progress, seems a good time to take an inventory.

As railroad interest in pulverized coal at this time lies principally in its value as a steam producer, the subject will be considered from that angle only. To date five different American railroads—the Atchison, Topeka & Santa Fe, Chicago & Northwestern, Delaware & Hudson, Missouri, Kansas & Texas and New York Central—have successfully operated during test periods individual locomotives equipped for and burning pulverized coal. These tests were all made under regular service conditions, and have demonstrated that locomotives burning pulverized coal will meet the train-handling conditions imposed by the different classes of service. None of the locomotives tested is in service at this time, it being necessary in most instances on account of war activity and demand for power to remove the pulverized-fuel equipment and discontinue the experiments.

Requests for information on results obtained from the tests made on locomotives were kindly complied with. The following points from replies received are of interest:

a. A carefully conducted test between two engines of the same class, one burning pulverized coal and the other hand-fired, showed that a saving of 23 per cent. in fuel burned could be made by burning pulverized coal. The main difficulties encountered were the slagging over of the flue sheet and burning out of the brick arch. The slagging was largely overcome by an air jet to blow off the slag accumulations. A number of burner arrangements were tried, but it was found impossible to overcome the rapid burning out of the brick arch. The cost of replacing the arch brick largely overcame the saving in fuel. The delay to locomotive, replacing arch brick, was also a decided drawback.

A comparison of total costs of hand-firing versus pulverized-coal firing on the locomotives tested, which include cost of pulverizing, cost of handling, cost of arch maintenance, interest and depreciation, showed the hand-firing to be the more economical.

In fairness to the pulverized coal it was thought possible to design a firebox that would eliminate such troubles as burning out of the brick arch and show an advantage in favor of the pulverized coal.

b. Burning pulverized fuel was quite satisfactory, furnished all the steam that was wanted with splendid control all the time, burning 60 per cent. anthracite and 40 per cent. bituminous, the bituminous being necessary to increase the volatile.

The question of economy is quite another thing, and unless a poor or byproduct coal can be purchased at a price that will absorb carrying charges, operation, etc., of a pulverizing plant and not exceed the price of a satisfactory lump coal, it should be given careful thought. There is no saving in the quantity of fuel used when pulverized, in fact the difference is in favor of the lump coal. Pulverizing costs between 45 and 50 cents per ton.

c. The burning of pulverzied coal in a locomitive was quite an easy proposition, and with us was very satisfactory. The only difficulties were with the drying, pulverizing and handling of the coal, and also the danger in connection with it. In case of a large number of engines being equipped to burn pulverized coal, were the plant to be blown up, burned or otherwise made inoperative, the locomotives would be tied up until the plant was in service again.

One foreign railroad, the Central Railway of Brazil, has made marked progress in burning pulverized coal. The following quoted from data kindly furnished by the Pulverized Fuel Equipment Corporation, will be of interest and give an idea of what has been accomplished:

d. The Central Railway of Brazil, after considerable investigation of pulverized-fuel-burning locomotives in this country, on account of the high cost of imported coal and inability to utilize the low grade domestic coal by burning it on grates, decided to install pulverized-fuel equipment for locomotive and stationary boiler purposes.

From a study of the coal measures in the southern part of Brazil during 1904-06 it was concluded that the native coal was unsuitable for economic use. Later, during 1915-16, at the direction of Dr. Miguel Arrojado Lisbona, then director of government-operated railways, an investigation was made of the use of pulverized fuel in the United States with the result that the Central Railway of Brazil decided to install a 15-ton-per-hour fuel-preparing and coaling plant and a stationary boiler equipment at Barra do Pirahy, an engine house and shop terminal about 65 miles north of Rio. Plans and specifications were prepared and installation was made. Arrangements were also made for the equipping of 250 existing and new locomotives, and since 12 ten-wheel type and two consolidation-type locomotives have been newly built and so equipped by the American Locomotive Co. and put into regular use.

The first locomotive put into service was No. 273, one of the ten-wheel type, which on its first round trip between Barra do Pirahy and Entre Rios ran a distance of about 110 miles, in freight service, in 7 hours 11 minutes, maintaining an average steam pressure of 172 lb. with maximum

*Progress report submitted by pulverized fuel committee to the International Railway Association. Committee consisted of W. J. Bohan (chairman), H. T. Bentley, H. B. Brown, R. R. Hibben, D. R. MacBain, J. H. Manning, H. C. Oviatt, John Purcell and L. R. Pyle.

working pressure of 175 lb., and with the pulverized-fuel-burning equipment working perfectly.

Steam pressure was easily maintained at all times with a clear stack with no difficulty whatsoever from ash or slag in the firebox or flues.

The first *official* run with the Brazilian native coal pulverized was made on Sept. 9, 1917, with a special train that transported Dr. Wenceslao Braz, President of the Republic of Brazil, and his staff. Ten-wheel type locomotive No. 282 handled the President's special train from Barra do Pirahy

ANALYSES OF FUELS USED

Name	Kind	Moisture	Volatile	Fixed Carbon	Ash	B.t.u.
Jacuhy	Bituminous	6.10	28.40	45.70	19.80	10,851
Santa Catharina	Bituminous	12.60	36.00	42.10	9.00	10,259
S. Jeronymo	Bituminous	3.00	31.00	39.30	26.70	9,565
Cascapava	Lignite	19.00	36.00	19.20	25.80	5,249

to Cruzeiro, a distance of about 90 miles, and during the greater part of the trip President Braz remained in the locomotive cab and fired the locomotive, on which the steam pressure was fully maintained throughout, without any smoke.

The Central Railway of Brazil locomotives equipped with pulverized fuel are operating in fast passenger, mixed passenger and freight, and freight service, and all are giving excellent results.

The results of tests recently conducted with Brazilian native coal and lignite may be stated as follows: (1) Distance traveled during trials was 118 miles. (2) Boiler pressure during trials remained almost constantly at 175 lb., which is working pressure.

The only difficulty met with has been in instructing the enginemen, who were not acquainted with this method of combustion, and for this purpose an illustrated instruction book has been issued to each man.

Only by adopting this pulverized-fuel system has the problem of the utilization of Brazilian coal, which cannot be burned practically or economically on grates or in retorts,

PERFORMANCE DATA

Name	Fuel Kind	Fuel B.t.u.	Quantity Burned Per Trip, Net Tons	Evaporation Lb. of Water Per Lb. of Fuel	Ash Found in Firebox and Pan, Lb.
Jacuhy	Bituminous	10,851	4.19	7.2	176
Santa Catharina	Bituminous	10,259	3.5	7.1	176
S. Jeronymo.	Bituminous	9,565	5.42	7.1	198
Cascapava....	Lignite....	5,249	4.41	7.3	220

or utilized to good advantage for the production of producer gas, been solved, and the development of the native coal fields of the country is now in process through the establishment of steamship and railway means of transportation from the mines, and in the actual mining developments.

Something like 200 pulverized-fuel installations on stationary plants are in operation throughout the United States, comprising central power and lighting stations, street railway power stations, power stations of various manufacturing industries, railroads, mining companies, smelters, sugar refineries, office buildings, hotels, schools, laundries, etc. These plants are reported as successfully burning all grades and classifications of anthracite, bituminous, sub-bituminous and lignite coals in the pulverized form.

The following are quotations from various replies to inquiries sent to different parts of the country asking for results obtained from stationary plants:

a. From an engineering company handling pulverized-coal equipment:

The advantages which can be obtained by using pulverized coal in plants where the quantity of coal used daily is sufficient to obtain a low cost of preparation is marked. In the first place, where pulverized coal is used, it is necessary that the boilers be equipped with combustion chambers suitable for the maximum amount of coal that will be burned to operate the boilers at maximum rating. The reason for these large combustion chambers is to eliminate refractory troubles entirely. The obtaining of good combustion is secondary to furnace life, and therefore this feature of design of the combustion chamber is the most important one to consider.

All kinds of coal can be burned satisfactorily in pulverized form regardless of quality, and there are no limitations to boiler capacity due to poor qualities of coal fired. Economy of operation is therefore far beyond that obtained by burning coal in lumps with any other kind of equipment, and from results already obtained there is no question in our minds but that pulverized coal is the coming fuel and that burning coal in pulverized form will shortly become the standard method of burning on account of the high economy obtainable.

b. Remarks in connection with a test made at an eastern experimental plant burning anthracite silt:

All claims made as to efficiency to be obtained were demonstrated to the satisfaction of everyone present, and it was remarkable how they made it possible to control the temperature in the ash pan. As you are aware, this has been the source of considerable trouble when removing the slag, but I wish to state no trouble in this connection was experienced at this test. The evaporation of 8 lb. of water per pound of coal was remarkable in view of the fuel used.

The proximate analysis of the fuel used in this test was:

	Per Cent.
Moisture	0.5
Volatile	8.5
Fixed carbon	78.0
Ash	13.0
B.t.u.	12,000 to 13,000

c. The folllowing is a log of test of a 300-hp. boiler burning a low grade of Pacific coast sub-bituminous pulverized coal exclusively at one of the power stations of a large West Coast traction, light and power company. (Figures shown in column A.)

The committee also obtained a log of test of two 512-hp. Stirling boilers located at one of the stations of another large railway, light and power company in another city in the same territory burning a similar grade of coal with Sanford Riley stokers. (These results are tabulated in column B for comparison.)

	A (Pulverized Coal)	B (Sanford Riley Stoker)
Type and capacity of boiler	B. & W. 300 hp.	Stirling 512 hp.
Duration of trial	14 hr., 7 min.	10 hr.
Temperature of feed water, deg. F.	185	150
Water evaporated, lb.	148,240	238,099.47
Temperature of steam, deg. F.	412	.....
Steam pressure, lb. ga.	112	.....
Factor of evaporation	1.1	1.17
Weight of coal, lb.	24,540	.....
Evaporation per lb. of coal as fired	6.05	5.175 (dry coal)
From and at 212 deg.	6.67	6.054 (dry coal)
CO_2 flue gas	13	8.8
B.t.u. raw coal	8,061	6,974 (as fired)
B.t.u. pulverized coal	9,688	9,650 (dry)
Efficiency, per cent.	67 (details not given)	
Kind of coal	Centralia-Tono	*Chehalis-Superior
*Approximate analysis	*As fired	*Dry Coal
Moisture	27.50	....
Volatile combustible	35.53	49.08
Fixed carbon	27.98	38.65
Ash	8.9	12.27
Sulphur	1.07	1.53
B.t.u.	6,974	9,650

NOTE.—Attention is called to the comparative closeness of results obtained considering comparative B.t.u. of the two dry coals.

d. Personal visits to pulverized-coal-burning plants installed in a large office building, a high school building and a large laundry in this city (a Western city) developed that at both the office and the high school buildings trouble was being experienced with moisture in the powdered coal, and that one case of explosion had occurred at the laundry

due to careless operation. Engineers in charge of these plants expressed the opinion that oil and powdered coal at present prices in that locality were about a standoff.

e. From a company handling pulverized fuel apparatus:

Supporting data will show you that past experience has demonstrated that for locomotive use the economy of pulverized fuel has been proved, and that the items of auxiliary cost, trouble with moisture reabsorption and slag are things of the past and not of the present or future.

f. From a cement company (Southwest) which has burned powdered coal in its stationary boiler plant to some extent:

We have for years used pulverized coal in our kilns and therefore are fully equipped for drying, pulverizing and conveying this fuel in powdered form. Our coal when dried contains less than 1 per cent. of moisture, and we have provided against damage and therefore have never had an accident on account of spontaneous combustion. I may state further that our limited experience leads us to believe that while there are some difficulties to be overcome, greater efficiency may be obtained from the use of coal in the powdered form, under properly equipped stationary boilers of suitable type, than can be obtained from the use of such coal in any other form.

g. From a large power and light company (Middle West):

We do not experience any slagging, brickwork or explosion trouble. Difficulties are being encountered due to moisture in the coal, but whether it is a reabsorption or not we cannot definitely state. We are making arrangements to determine this by changes in our drying plant. When this is completed we will have eliminated one uncertainty.

h. From a large smelting company (Rocky Mountain district):

In the following report of boiler test is shown the type and size of boilers used and the efficiency obtained in our power house boiler No. 8. Only No. 7 and No. 8 boilers are now equipped with pulverized-coal burners. But it is expected that we will equip the other boilers to burn this fuel in the near future. The power house boilers are used as auxiliary to the waste heat boilers in the reverberatory furnace flues; so that the load factor on these boilers is quite variable and the efficiency is correspondingly low.

The coal is dumped from the cars into coal bins; then on belt conveyors it travels past Ding magnetic pulleys, which take out all iron, onto rolls where it is crushed; into Ruggles coal dryers; up elevators to Raymond five-roller pulverizers; fan elevators and screw conveyors; to powdered coal-storage bins over furnaces to be fired. Eighty per cent. of the powdered coal will pass through a 200-mesh screen. At first considerable trouble was experienced with explosions. These difficulties were overcome by study of conditions. In drying the coal the temperature of the dryer and amount of air was regulated according to amount of moisture.

With moisture from 5 to 10 per cent. the temperature used is 110 to 130 deg. C.
With moisture from 10 to 15 per cent. the temperature used is 120 to 140 deg. C.
With moisture from 15 to 20 per cent. the temperature used is 130 to 145 deg. C.

Explosions are sometimes still experienced in the elevator that takes the coal from the dryer, but explosion doors are provided and the explosions do no damage. The pulverized coal in the storage bins sometimes ignites spontaneously, but these bins are air-tight and the smoldering fire is soon extinguished by cutting off the coal supply to the bin on fire, and feeding out the coal in the bin.

i. From a southwestern railroad:

I am not in a position to give you very much of a report for the past year, as our stationary boiler plant that uses pulverized fuel has during the past year been compelled to use a considerable amount of oil, this on account of breakdowns and other troubles, and also the mixing of oil and powdered coal.

The manufacturers have for some time, in fact almost all winter, been changing, overhauling and remodeling their equipment, and on two boilers we have had very little service on this account. I am not going to give you any figures as to the cost of using pulverized coal at our plant for the reason that our pulverizing and drying plant has not sufficient capacity to properly take care of the demands upon it, and this, you understand, requires more labor than would otherwise be necessary, hence the cost is greater and would not be a fair comparison. We have, however, kept the plant going on pulverized coal most of the time, but it has been a forced proposition.

The foregoing summary you will note has been collected from widely different sources. It is representative of the results obtained with different fuels throughout the United States and also is representative of the enthusiasm of the manufacturer of pulverized fuel apparatus and the reality of the man who must justify his engineering opinion for power installations by increased economies sufficient to justify the expenditures made and who must primarily keep the industry in which he is interested operating at full capacity. The following conclusions may be deduced:

The development of the art of burning pulverized coal during the past two years has shown marked progress in that the experimental work done and tests made, although still incomplete, have demonstrated the

EVAPORATION TEST ON 330-HP. TYPE K-19 STIRLING BOILER BURNING POWDERED COAL

1.	Date of trial	Sept. 6, 1918
2.	Duration of trial	6 hr. 48 min.
	Make of boiler	Stirling
	Sq.ft. heating surface	3,297
	Rated horsepower	330
	Volume of firebox	1,782 cu.ft.
	Number of burners	1
	Average Pressures	
3.	Steam pressure in boiler, by gage	153.5 lb.
4.	Absolute steam pressure	166.28 lb.
5.	Atmospheric pressure, 25.95 in.	12.78 lb.
	Average Temperatures	
6.	Of external air	77 deg. F.
7.	Of fireroom	80 deg. F.
8.	Of steam	366.6 deg. F.
9.	Of escaping gases	514 deg. F.
10.	Of feed water	64 deg. F.
	Fuel	
Kind		Wyoming lignite
State		Powdered

Analysis of Coal

	As Fired	As Received
Moisture	2.83 per cent.	19.2 per cent.
Volatile	42.77 per cent.	34.3 per cent.
Fixed carbon	49.90 per cent.	42.5 per cent.
Ash	4.50 per cent.	4.0 per cent.
B.t.u., per lb.	11,849	

11.	Total amount of coal fired	13,821 lb.
12.	Dry coal fired	13,430 lb.
13.	Combustible fired	12,808 lb.
14.	Total coal fired per hour	2,032 lb.
15.	Dry coal fired per hour	1,975 lb.
16.	Combustible fired per hour	1,884 lb.
	Quality of Steam	
Percentage of moisture in steam		3.3 per cent.
Quality of steam		96.7 per cent.
Degrees of superheat		0.
	Water	
Total water fed to boiler		99,679 lb.
Total water actually evaporated		96,390 lb.
Total water evaporated from and at 212 deg. F.		115,547 lb.
Water fed to boiler per hour		14,659 lb.
Water actually evaporated per hour		14,175 lb.
Equivalent water evaporated per hour from and at 212 deg. F.		16,992 lb.
Lb. of water fed to boiler per lb. of coal fired		7.21
Lb. of water evaporated per lb. of coal fired		6.97
Lb. of water evaporated per lb. of dry coal		7.18
Lb. of water evaporated from and at 212 deg. per lb. of coal		8.36
Lb. of water evaporated from and at 212 deg. per lb. of dry coal		8.60
Lb. of water evaporated from and at 212 deg. per lb. of dry combustible		9.02
Average heat in coal 11,849 B.t.u per lb. of coal as fired—		
Heat produced per hour		24,077,168 B.t.u.

Heat required to evaporate a lb. of steam as discharged from the boilers = 0.967 (1195.1 — 32.0) + 0.033 (338.7 — 32) = 1124.7 + 10.1 = 1134.8.

Total heat given to the boilers per hour = 14,659 × 1134.8 = 16,635,000 B.t.u.

$$\text{Efficiency of boiler} = \frac{16,635,000}{24,077,000} = 69.1$$

$$\text{Horsepower developed} = \frac{16,635,000}{33,479} = 497.$$

$$\text{Per cent. of horsepower rating developed} = \frac{497}{330} = 151 \text{ per cent.}$$

apparent soundness of the principle of burning coal in a finely divided form in suspension, and that the complete commercial success depends upon the further careful working out of such details as the correct determinations of proper fineness of the various grades of coals, and economical and efficient methods and apparatus for preparing, storing and transporting the pulverized coal to the stationary plant or locomotive furnace.

It has not been clearly established that coal ground to the extreme fineness and dried to the extent recommended by most of the supporters of pulverized coal best meets the conditions of the practical user operating under widely diversified conditions. The tendency to explosion and spontaneous combustion, which is always present in coal of this character, should be eliminated entirely if possible to do so. The tendency of reabsorption of moisture in containers and transmission piping in stationary plants and at coaling stations of railroads will always be a problem in climates having extreme variations of temperature and humidity.

Experiments to determine if thoroughly air-dried coal ground to the fineness of, say, coarse granulated sugar and burned in suspension in specially designed furnaces will not produce greater over-all economies should be made.

Individuality of Locomotive Should Be Considered When Using Powdered Coal

Further, in so far as the use of this kind of fuel on locomotives is concerned, it seems advisable to give more careful consideration to the individuality of the flexible steam locomotive as it exists today. Regardless of the objections which may be raised at this time to the locomotive stoker, the fact remains that it is a usable and practical device capable of producing economical over-all results. Much improvement may be expected in the locomotive stoker during the next ten years, and it is without the realm of possibility that a pulverizing and stoking device might be arranged that would prepare any grade of coal on the tender and deliver it to the firebox in the pulverized form, thus eliminating all of the expense incident to preparing and transporting pulverized coal from a central plant. The same thing would also apply in a modified form to a stationary plant.

As is frequently the case with large engineering projects this one has some too-enthusiastic promoters. Much ill-advised engineering work and experimenting has been done and some snap conclusions have been rendered without careful analysis of the problem and without the essential laboratory work necessary to the establishment of fundamental facts.

Some hurriedly prepared and conducted tests with incomplete and inadequate facilities and equipment have been made, particularly on locomotives on busy railroads during periods of heavy traffic movement. Tests of any kind conducted at such times always create prejudice, due to the fact that they are more or less of a nuisance. Such tests are frequently void of results, not only from lack of preparation and facilities, but also because employees cannot give them proper attention. In fact, the tendency of employees during such busy times is to do all they can to get rid of tests as quickly as possible. For these reasons also adverse opinions and doubt about pulverized fuel prevail in the minds of many.

It does not seem that we are using the laboratories of our great universities to a sufficient extent. Many of these universities have thoroughly equipped laboratories, and they always have many eager and bright young men who, guided by capable faculties, could and gladly would not only thoroughly thrash out all of the technical questions and lay the foundation for reasonably operative devices before making field applications, but the opportunity for so doing would vastly increase the practical knowledge of these students and better prepare them for the field of work they may select, by giving them an insight into the practical side of their work and thus produce increased man efficiency which would be of mutual value to both the young men themselves and the industries that employ them.

It is particularly noticeable in the reports of pulverized-fuel tests received by this committee that practically all dealt with fuel economy only and by means of a deluge of figures and "heat balances" conclusively proved fuel economy to everybody's satisfaction. Not enough has been said about "cash balances." All industries are operated for the purpose of paying dividends and maintaining economic balance. In this respect conclusive evidence is lacking about pulverized coal, at least in so far as this committee has been able to develop after careful inquiry. This has been disappointing. May we hope for some reliable statistics in the near future that will dispel all doubt that now exists on this important matter?

There is little or no question about the ultimate practicability, efficiency and economy of burning coal in a finely divided form, both in stationary plants and locomotives. To develop this fact to a practical conclusion requires thorough coöperation of both manufacturer and user and it is suggested that in view of the immense supply of bituminous, lignite and other grades of coals of various characteristics peculiarly adapted to the pulverized method of burning, that as soon as business conditions again adjust themselves, the railroads, with the assistance of manufacturers and universities, make the necessary conclusive and exhaustive tests and develop the fixed principles of methods and apparatus necessary to successfully meet the urgent demands for more economical consumption of coal. This is not a question of self-interest on the part of either manufacturer or particular industry. It is one of national interest and urgency.

After a mine explosion many miners and officials from other mines offer their services. The number of such volunteers is generally so large during the first four or five days following a disaster that the services of all the men cannot be profitably utilized, but they as well as those whose services have been accepted must necessarily be fed. For this purpose a commissary and mess should be established. The commissary should be placed in charge of the manager or superintendent of the store and the mess in charge of an experienced cook who should be furnished from the commissary the necessary stoves, utensils, dishes, etc., to enable him to supply wholesome food for the men doing the rescue and recovery work. The mess should be assigned to some unused building or part of a building or to a tent. The kitchen should be kept separate from the mess room, and all persons except those engaged in preparing and serving the food should be excluded from it.—*Rescue and Recovery Operations in Mines.*

Original Pocahontas Coal Field

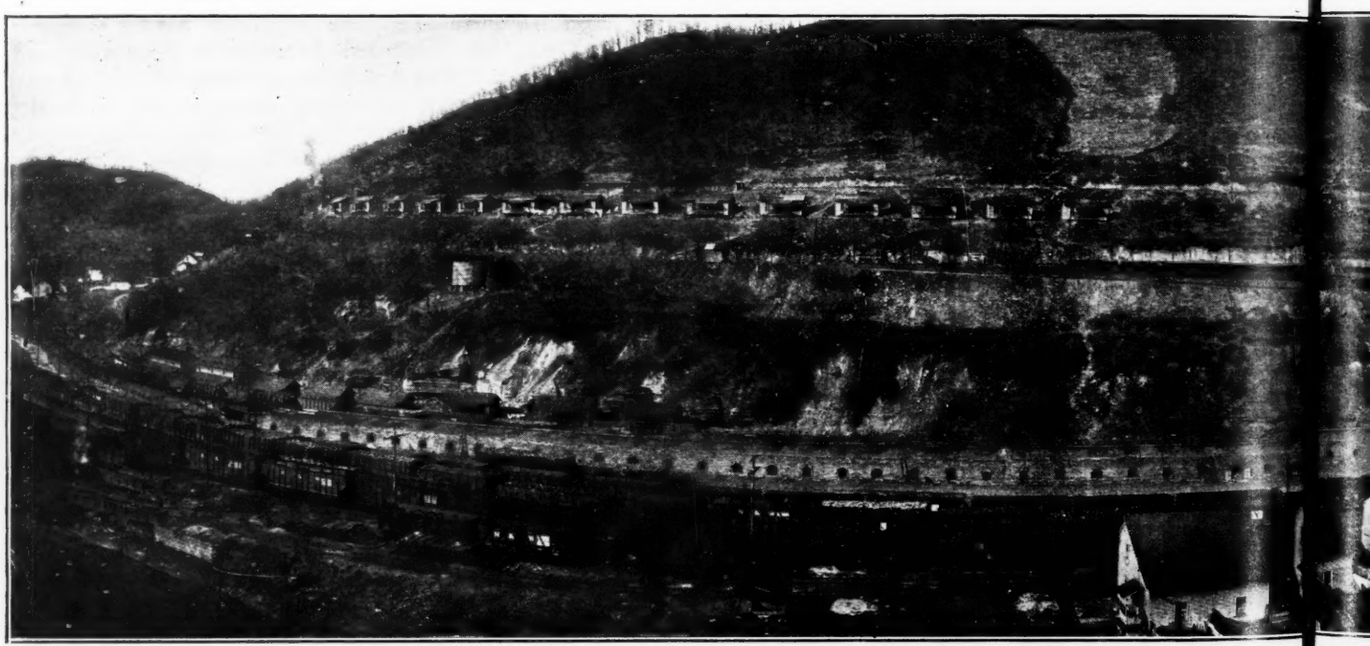
Among the pioneer coal and coke operations of the original Pocahontas coal field of West Virginia is the Houston Coal and Coke Co., whose plant (as it appears today) is shown in the accompanying panoramic view. The store and office of this company is opposite the Elkhorn station on the Norfolk & Western R.R. The Houston plant has expanded wonderfully under the management of the family whose name it bears, and the leadership of T. E. Houston. In the '90's a modest tipple occupied about the site of the present modern plant for preparing and loading coal. At that time Mine No. 2 of this company was opened up and preparations were actively prosecuted to make the operation what it is today—the largest single shipping plant of the old Pocahontas field.

With the increase of mine opening, greater accommodations were provided for workmen, more coke ovens were built and every facility added to handle large tonnage. The Houston tipple is located between the two mine openings, and the coal is moved from mines to dump over surface roads by motors. The location of these tramroads is clearly indicated by the grade and the line of trolley poles. Extensive sidings for loaded and empty mine cars are provided at the tipple, 50 loads being accommodated at one time. The narrow valley at this point is so completely taken up by the plant that it would seem as though "standing room only" were left.

The long line of inactive ovens calls attention to the days when the Norfolk & Western R.R. distributed cars for the transportation of coal in proportion to the number of coke ovens possessed by an operation. This was in the days when Pocahontas coal was making its way in the world, and often slack would have been a drug on the market were it not converted into coke. In the '90's new plants were sometimes developed and 100 or more coke ovens built solely to secure railroad cars. The ovens might be built of the cheapest materials and never be fired up; in a short time grass grew on the oven-clay filling, and later the firebrick disintegrated and the ovens caved. In the light of present-day practice this would seem to be quite a waste of capital.

It was during these days that an operator started a mine near the town of Pocahontas and decided to combat the policy which was then in vogue in the field. No coke ovens were built at his plant, and when the mine and tipple were about ready to ship coal he notified the Norfolk & Western of his intention to ship shortly and asked for a railroad siding and cars. This request being refused, teams were secured and coal from his plant was dumped at the railroad freight depot. This operator claimed that the railroad company was a common carrier of freight and should receive transportation when presented. The situation was an interesting one. In the course of time conditions in the field changed and the coal became one of the most famous fuels on the continent. In 1916 about 19 millions tons of coal were shipped from McDowell County, West Virginia.

The appearance of the Houston oven plant reflects conditions throughout the field. In 1916 there were 9730 beehive ovens in McDowell County, of which just 6269 were not in use; only about one-third of the ovens were making coke. While Pocahontas slack is in demand among byproduct coke oven operators who use it to mix with certain high volatile coal, many authorities claim that this noted fuel should never be used for any other purpose than raising steam, asserting that not a pound of Pocahontas coal should be made into coke. The Houston interests are represented at other points in the Pocahontas field, one plant, the operation at Keystone, closely approaching the mines at Elkhorn as regards annual shipments. The aggregate tonnage of the Houston plants shipping Pocahontas No. 3 coal amounted to 1,139,100 in 1916. As the operators of these noted Pocahontas mines look forward to the exhaustion of their properties, other coal investments are often made in territory adjacent to the original field. The Houston people have valuable properties in the newer Pocahontas field as well as in the Thacker territory.



PLANT OF THE HOUSTON COAL AND COKE CO. AT ELKHORN, W. VA., IN THE HEART OF THE ORIGI

Nova Scotia's Submarine Coal Mining Problem

At the extreme northern part of Cape Breton County, Nova Scotia, the coal measures dip toward and extend under the sea at low angles. The beds are affected by no important structural breaks or faults, according to "The Coal Resources of the World."

Mining operations beneath the sea have shown that the coal seams are continuous beyond the points where, from a consideration of the structure, faults might be expected to occur. From the undisturbed condition of the land areas it might be expected that the undersea area is also undisturbed and that a large portion of its coal, to a limited distance from shore, will utimately be utilized. The coal seams throughout the whole field are generally quite uniform in thickness.

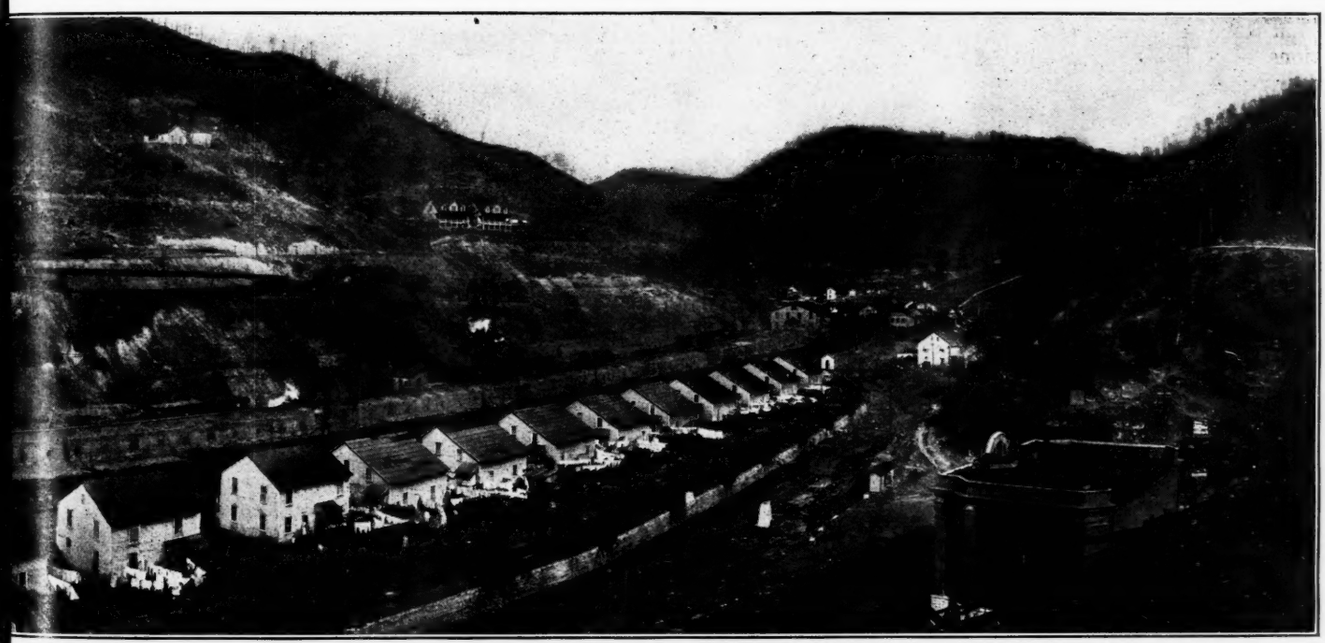
Mining operations are being extended under the sea at several points in the Sydney field. Some of the mines have workings extending over a mile from shore; at a distance of a mile some small rolls parallel to the coast were passed through. These are the only disturbances in the regularity of the measures, and it therefore seems possible, according to the authority previously noted, to extend the workings everywhere to the limit of haulage and ventilation. In an estimate of the amount of coal, the limit for probable reserves is fixed at three miles from the shore and that for possible reserves at five miles. Figuring on this basis and including seams of one foot or over to a depth of 4000 ft., the actual coal reserves of Cape Breton County are 1,027,911,000 metric tons; this calculation is based on actual thickness and extent. An approximate estimate places the probable reserves at 4,064,357,000 metric tons.

The Sydney coal field extends for a distance of about 30 miles in an airline along the northeast shore of Cape Breton Island. Recently a question of considerable interest, both from an engineering and a legal standpoint, has arisen in relation to the undersea extension of this coalfield, says an editorial in the *Canadian Mining Journal*. The coal practically can be attacked only from the shore end of the deposit and along a line 30 miles in extent. The system under which the undersea coal areas have been leased for the mining of this coal has permitted the blanketing of some leases by other leases.

A situation has now developed which calls for some remedial action by the Province, which is the lessor of the coal areas. It is the intention of the local government to enact legislation which will correct the existing condition. The lease plan of this coal area as it exists today shows a checker board of conflicting and interfering leases that absolutely prohibit the extraction of the submarine coal by any methods which would commend themselves to a mining engineer or operator interested in the best, the most complete and the most economical extraction of the submarine coal.

Probably when the early leases were given out to lessees the extent of the coal field was not known; its extension under the sea may have been given little if any thought. Furthermore, the lease lines were drawn arbitrarily to further disconnected and oftentimes conflicting private and corporate interests during many generations. The last and least consideration that has governed the layout of the submarine leases has been the preservation of the coal field for economical operation. It has been aptly stated of the lease plan that, like Topsy, "it growed." No person living is to blame for the tangle, but the remedy is within the power of those who administer the coal areas as stewards for the people of Nova Scotia.

The Cape Breton coal field is a unique deposit of coal, at least as far as the American continent is concerned. Its exact submarine extent is not known, but enough of its probable extent is known to state confidently that the field has a long future if it is conceived as one comprehensive mining proposition. It is a field in which one operation by unwise or careless management may depreciate the value of the whole or even impair the accessibility of a considerable part of it.



ORIGINAL POCAHONTAS COAL FIELD; ON MAIN LINE OF THE NORFOLK & WESTERN RAILROAD

A memoir on "The Coal Fields of Eastern Canada" was written for the Canadian Federal Department of Mines some three years ago by F. W. Gray. In this report is summarized the mining laws of the Province in relation to the unworked submarine coal field; the state of affairs revealed by the Fuel Controller of the Province was noted, and Mr. Gray stated that it was the obvious duty of the present generation "so to prosecute the work of extraction as not to imperil the accessibility of the remaining submarine coal." This is precisely what the present arrangement of the submarine leases will not permit of being done. If the existing lease lines are adhered to, the greatest single asset of the Province will be imperiled.

In discussing the limitations to working the submarine coal field in the memoir just referred to, Mr. Gray predicted that the cost of mining would be the first limiting factor to make itself felt. Therefore, no artificially difficult conditions of extraction should be unnecessarily imposed on mining coal from submarine territory. This would cause the limit of profitable mining to be reached sooner than would otherwise be the case, and the Province would the earlier lose its revenues and all the other advantages that accompany the production of coal.

If previous experience could have governed the leasing of submarine areas, then it would have been realized how different submarine mining is to ordinary land operations. In the latter case mine openings can be located at many points on the surface, but access to submarine areas is limited to certain parts of the shore. Therefore, it would have been seen that no submarine leases should have been granted, unless their accessibility was secured by the terms of the lease itself.

The present outlook for coal in Nova Scotia seems to be uncertain in view of the fact that this industry is admittedly going to have sufficiently hard work to keep its head above water without the addition of unnecessary duplication of expenditure and effort, and without the totally unnecessary addition to the cost of extraction which adherence to existing lease lines will inevitably cause. The truth is, says the *Canadian Mining Journal*, that the whole submarine coal question should be thoroughly reviewed. A map should be made of the whole coal field showing the existing workings, the outcrops, the location of the faults and folds, and all lease lines. Due consideration should be given to the facts disclosed by soundings at sea, the nature of the sea bottom, data concerning the superincumbent strata, the position of the coal seams and the probable extent of the submarine coal field. This information should have been available for reference on a government map, especially as the whole matter is controlled by the Province. Some of the data must have been on hand for many years; a complete land map at least should have been kept up to date. Other information could readily have been added from time to time and a comprehensive view of the whole situation would have disclosed at an earlier date the tangle which now comes prominently to light. But of course hindsight is distinctly better than foresight.

The making of the map proposed would seem to be inevitable. It should then come up for consideration by competent mining engineers who might to advantage practically disregard existing lease lines where they seriously handicap the final working of the coal field as a whole. This plan would necessitate considerable lease readjustment on the part of the owners of the coal (the Province) to satisfy the lessors. However, the conservation of the submarine coal, its protection from inundation, creep, improper mining and the preservation of its accessibility over the maximum period of operation should guide those having the readjustment in hand.

The measure which has recently been passed by the Nova Scotia Legislature regarding coal areas in Sydney Harbor, in which both the Nova Scotia Steel and Coal Co. and the Dominion Steel Corporation are interested, is a fair and reasonable one, according to W. D. Ross, vice-president of the former company. Mr. Ross commented that there is much misapprehension outside of the Province as to the meaning and effect of the act. This legislation is necessary owing to the hopelessly uneconomic location of the submarine leases in the Cape Breton coal field. The act provides that governmental inquiry is to be made by a commission and that on the report of this commission, the Governor may rearrange these areas so that the undersea coal may be systematically mined. The so-called blanket lease of the Dominion company is not to be interfered with, the act only applies to other submarine areas and due compensation is provided for. The governmental investigation and subsequent adjustment of this matter is expected to insure not only to the benefit of the Province but to the principal coal companies involved as well.

TARDINESS

By J. KENVIN
Jeddo, Penn.

Every day in the mines of America I make thieves of honest men.

I steal from employers precious hours, never worked, but paid for nevertheless.

I cause miners to hurry along forbidden haulageways when Death rides a speeding trip bound bottomward.

Outside men caught by habit hurry along forbidden paths or travel on busy planes and trips, risking life and limb to hide their guilt.

Breaker boys in my clutches hurry over dangerous drag lines and under speeding shafting, often meeting with injury or worse.

By these and other means I cause delay and friction in the starting of breakers and the operation of mines, and mar the workday at its beginning.

I am Tardiness. Promptness and Punctuality are my worst enemies.

AT ONE TIME it was considered that waste constituted fine coal, the largest piece of which passed through a $\frac{3}{32}$-in. mesh. This fine coal or culm approximated 7½ per cent. of the total output. At the present time coal passing through a $\frac{3}{64}$-in. mesh is either utilized at the plant, shipped or stocked for future use.

Haulage Capacity of Locomotives

By E. Steck
Hillsboro, Illinois

MINE superintendents often order a haulage locomotive of certain weight because they have seen such a locomotive in operation in some other mine, and hauling an amount of coal which they desire to haul in their own mines. If the locomotive fails to haul this amount of coal, or if its armatures burn out, the blame is often laid at the door of the manufacturer. The reason for this failure may be any one of a number of causes, as the haulage capacity depends on the following factors: Weight of locomotives, type of tires, speed of haulage, horsepower rating of motors, grades, weight of pit cars, type and condition of wheels on pit cars, condition of track, length of haul, number of cars per trip loaded, number of cars per trip empty, number of trips a day. In the foregoing it is assumed that the proper voltage is supplied to the locomotive.

The maximum drawbar pull of a locomotive in pounds is equal to one-fifth of the weight of the locomotive for iron wheels, and one-fourth for steel-tired wheels. This is on the basis of a clean, straight rail. Beyond this, excessive slipping of the wheels will occur.

The horsepower developed by the motors equals:

$$\frac{\textit{Tractive effort} \times \textit{speed of locomotive in feet per minute}}{33000 \times \textit{mechanical efficiency of locomotive.}}$$

For example, take a 10-ton locomotive with steel-tired wheels and a speed of 7 miles per hour:

$$\textit{The tractive effort} = \frac{2000 \times 10}{4} = 5000\ lb.$$

$$\textit{Speed in feet per minute} = \frac{5280 \times 7}{60} = 616.$$

Assume the mechanical efficiency as being 90 per cent., then

$$Hp. = \frac{5000 \times 616}{33000 \times 0.90} = 103\ hp.$$

The practice among locomotive builders is to furnish on standard equipment 10 hp. per ton, or on a 10-ton locomotive two 50-hp. motors.

The horsepower rating of this type of motor is on the basis of a rise of temperature of 75 deg. C. after one hour's operation at full load. In other words, if the locomotive under discussion were loaded to develop a maximum tractive effort at the end of one hour, the motor temperature would show a rise of 75 deg. C., which would mean, in a room temperature of 70 deg. F., a motor temperature of $70 + \left(\frac{9}{5} \times 75\right) = 205$ deg. Fahrenheit.

For a day's run the square root of the mean square values of the current for the various cycles of operation for the two 50-hp. motors must not exceed 75 amp. per motor; or, in other words, the average horsepower must not exceed 34 per cent. of the normal rating of the motors.

The drawbar pull to move pit cars varies greatly with the condition and type of car wheels. This variation may be from 15 to 50 lb. per ton. A conservative average is 30 lb. per ton. On grades 20 lb. per ton additional is required for each per cent. of inclination independent of the friction of the wheels.

Again referring to the 10-ton locomotive with a maximum tractive effort of 5000 lb., the total drawbar pull on various grades is as follows:

Drawbar pull on level $= 5000 - (30 \times 10) = 4700$ lb.
Drawbar pull on 1 per cent. grade $= 5000 - (30 \times 20)\ 10 = 4500$ lb.
Drawbar pull on 2 per cent. grade $= 5000 - [30 + (2 \times 20)]\ 10 = 4300$ lb.
Drawbar pull on 3 per cent. grade $= 5000 - [30 + (3 \times 20)]\ 10 = 4100$ lb.
Drawbar pull on 4 per cent. grade $= 5000 - [30 + (4 \times 20)]\ 10 = 3900$ lb.
Drawbar pull on 5 per cent. grade $= 5000 - [30 + (5 \times 20)]\ 10 = 3700$ lb.

The number of tons this locomotive will haul on the different grades is as follows:

$$\text{Level, } \frac{4700}{30} = 157 \text{ tons.}$$

$$\text{1 per cent. grade, } \frac{4500}{(30 + 20)} = 90 \text{ tons.}$$

$$\text{2 per cent. grade, } \frac{4300}{[30 + (2 \times 20)]} = 61 \text{ tons.}$$

$$\text{3 per cent. grade, } \frac{4100}{[30 + (3 \times 20)]} = 46 \text{ tons.}$$

$$\text{4 per cent. grade, } \frac{3900}{[30 + (4 \times 20)]} = 35 \text{ tons.}$$

$$\text{5 per cent. grade, } \frac{3700}{[30 + (5 \times 20)]} = 28 \text{ tons.}$$

Assume that a pit car weighs 2500 lb. and has a capacity of 4 tons, the number of cars and tons of coal this 10-ton locomotive is capable of hauling will be as follows:

Grades	*No. of Cars*	*Tons Coal per Trip*
Level	30	120
1 per cent	17	68
2 per cent	12	48
3 per cent	9	36
4 per cent	7	28
5 per cent	5	20

The foregoing tabulations give the haulage capacity of the 10-ton locomotive on the basis of one hour with a maximum permissible rise of motor temperature. The continuous capacity of the locomotive would be only 34 per cent. of that given in the tabulation. The actual cars per trip must be calculated from the sequence of grades, the number of empties and the number of loads per trip, as well as the number of trips per day. The square root of the sum of the mean square values of the currents must not exceed, in this particular case, 75 amp. per motor. The current values can be determined by placing an ammeter on the locomotive and taking readings for a round trip, and then taking into consideration the number of trips per day. The graphic ammeter is the best variety to employ because the time during which the various current values flow through the motors of the locomotive may be readily calculated from its graph.

Attention should be paid to curves, as the track gage on them should be increased, especially where long wheel base locomotives are employed. Otherwise the wheels will bind and reduce the haulage capacity of the locomotive.

National Coal Association Holds Meeting at Chicago

The National Coal Association meets in perfect harmony after several months' experience in co-operation. A banner in the meeting room states that "The big idea of coöperation is education." The members are fully committed to that form of education as far as it is embodied in open prices, but there are not a few who still halt at accepting Dr. Garfield's appeal for open costs of production.

EVERYTHING at the meeting of the National Coal Association, held in Chicago May 22 to 24, moved quietly and according to schedule, but the session did not lack for enthusiasm nevertheless. The only unexpected discussion was one relative to the use of Mexican oil. That matter may, in the future, cause no little anxiety in the minds of the members of the association. Some are already keen to its possibility as a menace.

The meetings of the association were held in the Congress Hotel, and no one was excluded, the regular press table being well filled and plainly in evidence. The association lays all its cards on the table. It is not purposing the violation of any laws. Never was an organization more careful of its ground. From the rostrum its attorney watches every move like a hawk, ready to counsel the meeting should it in its proceedings vary a hair's breadth from the straight and narrow way of strict legality.

An address of welcome was made by H. H. Merrick, president of the Chicago Association of Commerce. He declared that the three essentials of life were air, water and coal. Chicago, he said, had them all, and it was certainly true that Chicago had more than its share of rain and smoke-laden air while the members were in session.

Suspicious of Proposed Amendments

Proposed amendments to the charter aroused the suspicions of one of the West Virginia delegations, of which Tom Lewis was a conspicuous leader. Mr. Lewis sought to delay action on the amendments until they were printed and duly considered by all present. Later, when it appeared that the voluminous amendments might be expressed by laymen in a few words, and would be dismissed by them in a few minutes as entirely inconsequential, Mr. Lewis and his friends withdrew their opposition. By that time the amendments were in the print shop and shortly thereafter were ready for distribution. They were carried unanimously. The only purposes of the change were (1) to lift bodily out of the charter the requirement that there be 37 directors, (2) to put that provision in the by-laws and (3) to give the general secretary the title of vice president with all the powers of the general secretary intact.

The word "secretary" has a progressively attenuating value. The word "general" placed before it does not attain the object sought, which is to name the real executive officer of the organization. Some institutions have added "general manager" to the title, but "vice president" is, by and large, considered the better term. Hence J. D. A. Morrow, the permanent central ganglion of the National Coal Association, becomes "vice president in receipt of pay."

President Wheelwright's report confined itself in the main to a recital of the cheerful acquiescence of the coal industry in the work of the war. General Secretary Morrow, with business-like and fluent oratory, took up the questions confronting the association in some detail. He said that the war revenue legislation was written with an eye to the manufacturing industries and not to mining. Washington was not blind to the fact and was prepared to recognize the difference as taxables between the two types of industries.

He spoke a good word for open prices—open covenants openly arrived at. The reports of prices as received did not, he admitted, cover the whole country. Some associations had not gathered their forces together properly since the war and could not at that moment collect price data. Others doubtless viewed the propriety of open prices with some doubt. What data had been collected did not include all the sales made. The collection of such data would probably never be complete.

Open Market Prices Inspire Confidence

But even in the Stock Exchange there are "wash sales" which disguise the real market movement. There are sales made out of the exchange regarding which no word is obtainable. Nevertheless the Stock Exchange prices receive almost universal recognition. They inspire confidence. No one feels, when he buys or sells on their indications, that he is being, or is even in risk of being, dealt with unfairly.

They shed a light on the conditions of industry, and a similar light is shed by the open price in the coal market. It is about the only large basal industry which has till the present been content to grope in the dark. Given a dark room and a cry of fire, the members of the august assembly he was addressing might be found bleeding and mangled as a result of a wild, haphazard rush for the exits. But given a light, all might be expected to find their way out by the devious paths that led to the adjacent room.

Similarly, given the cry of low-price sales in a market unlighted by published quotations, the mine operators might expect to find themselves, as they had often found themselves before, struggling in the dark and injuring one another in the hope of finding an exit from their financial troubles by the dangerous and mutually harmful way of unfair competition. The darkened way is over the chairs and the lighted way, the way of the corridor.

He said the operators would sit up nights trying to save a fraction of a cent in the cost of production and then with the return of the working day would give away several times that fraction in the first contract that they made.

In the afternoon it was decided that a portion of each company's assessment be allocated to payment for the

Digest, so as to make that publication subject to second-class rates. The railroad-relations committee recommended in its report that legislation be passed forbidding the assignment of cars in return for the acceptance of railroad orders.

One of the star features of the meeting was the report of the cost-accounting committee as read by Thomas T. Brewster. As it is printed and will go to all the members, it is not necessary to consider it here. Taking issue with some of the recommendations of the Federal Trade Commission, the committee relies on the commission to show again the broad judgment that it has always exhibited in the past and to modify its stand wherever a good case can be made for the change.

The foreign-trade committee did not report. It is understood that the committee of 27 formed a subcommittee of three which went to Washington and obtained a promise that 1,500,000 tons of shipping would be allocated to the coal industry in the last quarter of the year. This is regarded by some as entirely inadequate, and indeed it will be so unless the allocation is permanent and not for one trip only. The reason for the delay of the report was the absence of Thomas F. Farrell, the chairman, who was at the coast to welcome his returning soldier-son.

The credentials committee reported that 28 associations were represented and that 21,009 votes would be cast out of 21,050.

On the following day Dr. H. A. Garfield, United States Fuel Administrator, made a valedictory address in the spirit which has endeared that official to the coal industry. He admitted that the Administration had made some mistakes. He said he did not blame the N. C. A. members for criticism so long as it was constructive criticism. This was, he added later, his valedictory. Some would be glad he was saying goodby; to such he could only say that he was glad to say goodby to them. This was said in Dr. Garfield's most winning manner. Not even those at whom it was aimed would take offense. But he intimated these persons were few in number and that he was more than pleased that after the years of trial he was a welcome guest to the counsels of the National Coal Association and a good friend to those engaged in the production of coal.

Dr. Garfield declared himself of the opinion that owing to the increased size of corporations we could no longer do business as in earlier days. Some corporations are now so large that they employ as many men as there were people in the thirteen states at the foundation of the republic. Some corporations are as big as some governments in 1776. The same rules could not, he believed, be applied to such mammoth corporations as had been adequate when dealing with partnerships and individuals. The day of "laissez faire" he felt was passed. Hereafter it was not a question whether government shall interfere, but how much.

The coal industry has grown in public respect. When the war started the railroads, recognizing that coal would keep, kept it on the sidetrack. Coal, we have learned, is the food of industry. We have recognized at last that the army is but the cutting edge of our nation, whereas industry is the real force by which the nation triumphs.

Strategy is no longer confined to the foughten field. In a large sense it runs back behind the lines. The narrow pass which decides a campaign may not be crossed by men of war. It may be merely some congested point of traffic or a shortage of bunker space in a harbor. The lack of supplies that its existence causes may not be felt at once, and it may be some months later when the issue at the strategic point decides the campaign.

Dr. Garfield added that, fortunately, owing to the stimulus given the industry in production campaigns, our production grew progressively larger as the war advanced, whereas in other countries it progressively declined.

He urged the industry to hold firm to cost accounting and warned the mining men that if the public believed it was not getting a square deal it would not be satisfied, and the industry would then have to settle with radicalism. He advocated open production costs, so that the United States might know that the coal business is properly conducted. There are three parties in interest—the consuming public, capital and labor. They may well sit apart in their counsels but they should, before final decision, sit together. The cost of production should be as well known to the Government as the cost of living.

The report of the finance committee was as follows:

	Expenses Year Ending Mar. 31, 1919	Expenses Estimated Year Ending Mar. 31, 1920
Executive	$43,576.68	$43,000.00
General office	33,987.02	31,064.46
Information	116,762.58	40,648.56
Traffic	10,886.00	9,700.00
Accounting	3,391.64	7,400.00
Legal	14,501.20	12,000.00
Market information service	1,833.68	21,000.00
Equipment	1,162.94	2,000.00
Total	$226,099.74	$167,313.02

In the afternoon the new president, Harry N. Taylor, took the chair. He declared his determination to give a square deal to the multiple interests of the National Coal Association: A. F. Sheldon, president of the Sheldon School, addressed the meeting on "Selling Coal for a Profit." His address was excellent though not strikingly new. He based salesmanship on service. It was at the conclusion of his remarks that the discussion on Mexican oil arose. C. E. Bockus, president of the Clinchfield Coal Corporation, said that the oil could be produced for 19c. per barrel with a labor cost of only 8c. It can be delivered on the coast for from 60c. to 70c. a barrel. Two or three hundred contracts have been placed, to come in effect as soon as the refining plant being erected at Charleston, S. C., is completed. With oil at such prices coal would have to be sold on the coast at $2 or $3 per ton. T. W. W. Guthrie, president of the United Coal Corporation, Pittsburgh, Penn., stated that if coal of equal thermal power to oil were to be delivered to the market it would have to be sold for 20c. per ton to compete on an even basis with oil when freight rates are considered.

The smoker held Tuesday evening was a most enjoyable event, especially an address by an orator named Mallett, of the *American Lumberman*. His epigrams kept the whole party convulsed.

THE FOLLOWING ACCOUNT of an accident furnishes food for thought from several different angles. A motorman left his trip while it was in motion and with the power turned on, and ran ahead to open a door; he fell on the track and was run over and killed by the trip. This man's idea likely was not to save time but rather to avoid the trouble of walking back to his trip. A motor should never be left alone with the power turned on; it would also be well to reflect that an automatic mine door would have avoided the issue altogether.

Liquid-Oxygen Explosives*

The military necessity which compelled Germany to requisition her entire stock of nitric explosives created an emergency which gave liquid oxygen its opportunity, and its development as a mining explosive has occasioned considerable comment.

The explosives now in general use are mixtures or definite compounds containing two essential constituents, a combustible element—carbon—and an ignition element—oxygen. The explosion is the result of the abrupt and violent combination of these two elements. Oxygen is introduced under the form of nitric combination or chlorinated combination, whereas the carbon is in the form of an organic matter. Therefore, in ordinary explosives, the combination of the active elements carries with it a considerable dead weight, constituted by the other elements.

New Explosive the Result of Evolution

This is not the case with "Oxyliquit," for in the latter the liquefied oxygen is put in contact with carbon in a divided and porous form. Under a system of ignition the combination takes place with explosion, and in principle the procedure is perfect. In the evolution of this process, however, which was first invented by Linde in 1895, many difficulties were encountered.

Liquid oxygen is always produced on the spot where it is to be used, as it is impossible to prevent volatilization for very long, notwithstanding all the precautions. It is prepared by liquefying the air, the mixture so obtained of liquefied nitrogen and oxygen being submitted to a partial distillation, which eliminates the larger part of the nitrogen, more volatile than the oxygen. The resulting bluish liquid contains about 85 per cent. of oxygen. A German company exploiting the Linde patents is able to furnish installations giving an hourly output of 23 lb. (10 kg.) of liquefied rectified oxygen.

Containers Used for Transporting Liquid Oxygen

Transportation of the liquefied oxygen from the place of production to the place of utilization, mine or quarry, required a new container. In the laboratory, glass vessels, so-called "Dewar" bottles, having double walls with a vacuum between, have been used for the keeping of liquefied oxygen. These bottles are not closed—on account of the danger of a closed bottle in handling—but, owing to good insulation, the loss of oxygen by evaporation is small. These glass bottles, easily breakable, are neither convenient for wholesale manufacturing nor for use in the workshop, and are now replaced by containers of metal—especially brass and steel—which give excellent service.

The steel or brass bottles do not hold the vacuum as well as those of glass, and the vacuum must be often renewed. To lessen this inconvenience, Dewar inserts porous charcoal between the walls.

By what is known as the Kowastsch method, the liquid oxygen is poured upon lampblack in the borehole. A cylindrical cardboard cartridge is made of the same diameter as the hole, the cartridge containing the lampblack or other porous material rich in carbon. It is closed at both ends with cardboard or cork. Two small tubes of thin cardboard pierce the stopper at the outer end. These tubes serve for the pouring of the oxygen; also for the ignition system (fuse or electric). The cartridge being thus made, a metal rod is inserted in each tube to prevent it being crushed, and the cartridge is deposited at the bottom of the hole, which is then packed with a wad of clay. The metal rods are extracted and the liquid oxygen is poured in through the larger tube by means of an elbow funnel. The gaseous air escapes by the shorter tube, and also the overflow of liquid oxygen when the cartridge is saturated completely. The cartridge is now ready for the firing. The explosion is comparable to that of dynamite.

The Marsit method allows of a more regular working. It is therefore more in use than the other. Here the cartridge is saturated before being introduced into the borehole. To do this the cartridges are immersed in a special vessel of cylindrical shape with double walls filled with liquid oxygen. The cartridges are first exposed for a few minutes to the vapors above the liquid to cool them off, then completely immersed for half an hour. The saturation is therefore complete. When the cartridge is saturated, it is taken out and the ignition system attached as quickly as possible. It is then placed in the borehole, tamped and exploded.

Inconveniences of Marsit Method

The manipulation in this method is far simpler than in the first mentioned. The only inconvenience is the unavoidable delay between the taking out of the cartridge and the placing in the borehole. During the lapse of these few minutes a certain part of the oxygen of the cartridge evaporates. To lessen this loss, and to keep in the lampblack a sufficient excess of oxygen, the walls of the cartridge, which are made watertight, are of corrugated cardboard. No detonator is needed to explode these cartridges, and this is one of the advantages of the new method. All that is necessary is a small primer ignited by a fuse or by electricity.

The principal company manufacturing "Oxyliquit," the Sprengluft Gesellschaft, of Berlin, claims to have delivered each year an equivalent of 10,000 tons of nitric explosives. Even allowing for probable exaggeration, this figure shows how widely this product is used in Germany. Its greatest advantage over other explosives is that it almost entirely eliminates the danger of accidents. The cartridge itself is explosive for about 10 min. only, between the time of its saturation and the time of its ignition. During this time the danger is not any greater than with any other explosives. The result is that in case of a miss it is only necessary to wait half an hour for the cartridge to become entirely harmless, and then one can uncover the borehole without danger. Moreover, all dangers inherent to transportation and storage of the explosive are entirely eliminated.

Some Objections to the Method

The method, however, has its inconveniences, the principal objection being that it is impossible to store liquid oxygen, necessitating the establishment of a liquefaction and rectifying plant at the place where it is used. Also, there is need of experienced hands for a quick charging of the boreholes.

Theoretically the new explosive may claim superiority over others. In practice, however, it gives an explosion hardly equivalent to the most powerful explosives known, common dynamite and gelatin-dynamite.

*Abstract of an article appearing in the January issue of *Compressed Air Magazine*.

Urge Elimination of Waste in Mining and Consumption of Coal

In pointing out the means of remedying wastefulness in the use of energy resources, C. C. Gilbert and J. E. Pogue, of the Division of Mineral Technology of the National Museum, make the following reference to coal:

Coal is the basis of organized life—the home, industry and commerce are entirely dependent upon it. Under the present conditions, it is failing to live up to that responsibility. It is wastefully mined because of unnecessary conditions of competition; it is wastefully distributed as a result of unnecessary transportation to regions already supplied with water power or with coal of a lower grade than that transported; it is wastefully used because the numerous valuable byproducts resulting from burning coal are not recovered.

The wastes in mining may be decreased by considering coal as a public utility and eliminating undue competition, by integrating the mining operations—organizing them to work together instead of in competition. Unnecessary distribution of coal may be reduced by developing water power in favorable regions, and by improving methods of utilizing the large quantities of lower grade coal in the regions where it occurs, doing away with the necessity of hauling high-grade coal to those localities. The waste in utilization of coal may be eliminated by establishing municipal public utility fuel plants to convert coal into gas for heating purposes, at the same time recovering the valuable byproducts, ammonia. benzol and tar. This method of community use of coal will give cheaper fuel, end the smoke nuisance, relieve transportation, and cause the growth of a great coal-products industry, whose ultimate possibilities are beyond the grasp of imagination.

In concluding, the authors reduce the whole energy situation, an extremely complicated subject, to a fundamental basis in which two courses of action on the part of the Government will bring about the proper development of the whole matter.

1. The provision of a common-carrier system for the transmission of electrical energy, which will lead to a balanced development of coal power and water power, and serve as a coördinating influence in the building up of municipal public-utility fuel plants.

2. The application of a constructive economic policy to the production of petroleum, which will largely correct the wasteful methods which are now leading to a premature exhaustion of the petroleum resource.

Foreign trade, despite the relaxation of many restrictions, is still hampered by Government regulations.

Reifkin Sues du Ponts for Commission on Coal Purchases

A suit for $473,750.43 against the E. I. du Pont de Nemours Co. has been filed in the Supreme Court of the District of Columbia by Philip M. Reifkin, formerly of the Bureau of Mines. The amount in question is alleged to be due Mr. Reifkin as a part of his commission while acting as coal purchasing agent for the du Pont company. Mr. Reifkin alleges that between Nov. 15, 1917, and Mar. 31, 1918, at the request of the company, he obtained for them 3,168,100 tons of bituminous coal for a commission of 15c. a ton and 41,950 tons of anthracite coal for a commission of 20c. a ton. He received on account of his claim $9,854.57, and alleges that the company refuses to pay the balance.

Many Coal Companies Paid Unnecessary Taxes to Government

Now that the coal industry is becoming more familiar with the revenue act, it finds that many companies have paid more taxes than was necessary. Since it is held not to be the intention of the law to take money inequitably from those that were undercapitalized, or who made payments through miscalculation, it is believed that arrangements will be perfected to make reimbursements in all such cases. The matter is being presented vigorously to internal revenue authorities at the present time by attorneys for numerous coal interests.

Railroads Trying to Collect Old Accounts

In their efforts to relieve their present financial stringency, the railroads are going to unusual extremes to collect money. They are going over their books and raking up old accounts that had been regarded as impossible of collection. In a large number of cases, freight bills which the consignee has failed to pay, and which cannot be collected, are being presented to the consignor. A large number of suits are being filed in such cases. A considerable percentage of such cases is based on coal shipments.

While the Industrial Board of the Department of Commerce is a thing of the past, due to the refusal of the Director General of Railroads to coöperate with the stabilization program of the Department of Commerce, it is believed that his very obstinacy in this matter will bring the whole question of consolidated purchasing power to an issue.

EDITORIALS

Overwhelming Flood of Money

INFLATION is not necessarily accompanied by high prices, any more than quantities of mines are inevitably associated with large tonnage, or extended lengths of railroad lines with car-miles of transportation.

Mines, at times, lie idle or work irregularly and half-heartedly and the tonnage is low despite the multitude of collieries. Railroads which could carry immense quantities of merchandise may rust for lack of traffic. Similarly, when times are unfavorable any amount of currency and credit may be idle.

But granted there is a demand, the mines produce a flood of coal, adequate railroads will transport endless quantities of goods and the currency will support an unheard-of amount of inflation. That is why we have to fear the flood of money of which the world is now possessed. When we get busy the money will come pouring out upon us. Comparatively idle now, it will be active tomorrow.

We want a little higher price now only for stimulus. In the year coming we may well find it disturbing to our social relations. The war increases will not be duplicated; nor, alas, will the war patriotism. We shall not have the chance to stay the ill feeling that a readjustment may bring with it. For this reason it would be well if we could secure a new dollar such as Professor Fisher has been advocating, a dollar that will be a unit of consumption and based, not on gold values, but on all the elements which enter into our expenditures for living.

Labor is most efficient when times are bad and there is little demand for goods. As soon as times become good the workmen become indifferent and listless. Thus supply is shut off by demand and actually fed by lack of orders. All of which contradicts, in part, the law of supply and demand.

Spectacular Career of Electric Mine Motor

THE electric locomotive for haulage purposes in and around the mining districts has become such a matter-of-fact part of the equipment today that one seldom considers how rapidly it has forged to the front as the dominant system of haulage in the coal mines. The mine operator of this country is quick to appreciate the advantages of improved equipment and there is, perhaps, no better example of this than the spectacular career of the electric mine motor. For example, the number of electric locomotives in use in and around the Pennsylvania bituminous mines had increased from 1300 in 1910 to 2600 in 1916, thus doubling itself in a six-year period.

This same period has witnessed the gradual demise of steam and air locomotives. The steam locomotive underground has shown a gradual but fairly persistent decline in numbers, from 166 in 1910 to 142 in 1916, though it did show indications of recouping its declining fortunes in 1912, when 168 were in use; however, the decline in their use since that time leaves small room for doubt as to the ultimate future of the steam locomotive in the coal mine.

Even the air locomotive, with its reputation for safety in gaseous mines, is apparently suffering the same fate. This type of locomotive apparently reached the climax of its career in 1915, when 168 of these machines were in use, this representing an increase of about 20 since 1910. There was a gradual decline in their use in 1914 and 1915, the number falling off six in each year. But in 1916 there was a sharp decline of 19, making the total in use in that year 137, or twelve less than in 1910.

The history in the anthracite field is much the same, though the decline of the steam and air motor is less evident. The number of electric locomotives has practically doubled, there being 568 in use in 1910 as compared with 1133 in 1916. The air locomotives in use in 1910 numbered 142, this increasing to a maximum of 163 in 1912. This number remained practically stationary until 1915, when there was a moderate decline to 156. The number of steam locomotives increased up to 1915, but the succeeding year showed a very sharp decline; a continuation of this movement can have but one final result.

Nor is this trend confined alone to the State of Pennsylvania. Ohio, with high wage scales, has been quick to adopt any means that might reduce operating charges, and the increase in the number of motors there has been quite as rapid as in the Pennsylvania field. The state report shows 405 electric motors in use in 1909 and 525 in 1912.

The reports from Illinois tell the same story; in 1907 there were only 129 electric locomotives in use in the mines of Illinois, and in 1917 there were 744. Statistics for this state also show the falling off in the use of cable and animal haulage. In 1907 there were 26 mines using cable hauls and only five in 1917. Even the old mine mule has had to give way before his more efficient and economical brother, the mine motor. The reports show that some 27,000,000 tons of coal were handled by 303 mules in the year 1907, and 10 years later there were only 113 left, which handled 9½ million tons.

Figures such as these cannot but bring home to the mine operator the need for closer attention to the mechanical side of his operations. It is only in this way that the economies necessary to meet the aggressive competition that marks the coal industry today can be met. Further improvements in mechanical equipment are necessitating higher grade men as time goes on, and it is not unlikely that the next decade will see the mechanical engineer as an important official at all the larger mining operations.

Operators could well take example from the army in its rehabilitation work. There is no reason why a man who has lost one or more of his members in a mine accident should not be prepared for some job for which his injuries do not necessarily render him unfit.

Other Times, Other Preferences

STYLE changes. First of all, "Any coal so it's bright"; then, "Any coal so it's chunky." Later we began to inquire into its sulphur and phosphorus contents, then into the thermal values. Still later we started investigations into the fusing temperature of ash. We may yet regard content of recoverable nitrogen as the true index of superiority or, perhaps, the quantity of material solvent in phenol or the amount of pyridine extract. As we play new favorites among coal qualities the high places of coal production will change their location. We do not now know whether the type of coal produced in the Pocahontas region or that found in North Dakota will eventually be considered preferable?

The operating revenue of the railroads under the Government administration during the first three months of this year was $1,125,078,000; the loss was $192,000,000, or 17.06 per cent. on every ton hauled. A good beginning for Government ownership!

Is It Safe to Dry the Air Entering Coal Mines?

FOR SOME time English engineers have been considering how best to meet the difficulties of mining coal at great depth. It is claimed that the heat and humidity of the air will be the principal obstacle to be overcome at depth. The remedy suggested is the cooling and drying of the air entering the mine and, if necessary, drying the air at different points in the mine. This operation is common practice in refrigeration establishments. It seems that it is not so much the heat that affects the miners as it is the heat combined with the moisture in the atmosphere. It is well known that if the humidity is low, perspiration takes place freely from the surface of the human body and a man may be fairly comfortable even though the temperature of the air is high. Suffering is caused by the atmosphere being so charged with moisture that perspiration is not readily absorbed.

It has been suggested that modern cold-storage methods be followed as to mechanical equipment to dry and cool air entering mine workings. While overcoming one objectionable feature by this method will not dangerous conditions of another sort be brought about? In some gaseous and dusty bituminous mines in the United States it is common practice to humidify the air and to sprinkle the roadways to keep down the dust. Will not the possibilities of coal dust explosions be increased in some instances by drying the air entering mines?

Pinching the dollar till the eagle screams was well enough during the war. Let the dollar loose now, wherever the expenditure will serve to restore the wastes of deferred maintenance.

Powdered Coal and Its Application

INQUIRIES reaching *Coal Age* concerning the applicability and use of coal in powdered form show that the characteristics and utility of this method of combustion are not thoroughly understood by the average person. The introduction of finely divided fuel into a furnace by means of a strong air blast, and the production there of a flame with intense heat strongly resembling a gas or oil flame, is apparently sufficiently spectacular to take powerful hold upon the layman's imagination.

That powdered coal will burn while in a state of suspension in air has been common knowledge among engineers for many years. Serious attempts to utilize this process on a commercial scale started about the beginning of the present century. Today, after approximately twenty years of experiment, trial and use, the limitations of the process are fairly well defined and accurately known.

A powdered-coal fire is one of great heat intensity or high local or centralized temperature. In certain metallurgical processes this is exactly what is desired. Here the value of the metal treated is large compared to the cost of the furnace. The degree of temperature necessary to fuse the metal is sufficient to ruin the furnace after a certain number of runs, regardless of the kind of fuel used. To such processes pulverized coal lends itself admirably, and is consequently there employed with excellent results.

Difficulty experienced with powdered coal in steam-raising has arisen from the fact that the temperature attained in the furnace is greater than the boiler setting can long endure. Here the process is continuous, and the value of the product (steam) made daily is small compared to the cost of the setting. Frequent renewal of the furnace or its lining is therefore out of the question.

The claim that coal burned in the powdered form yields more heat than similar coal burned on grates is, other things being equal, absolutely false. Any unit, such as one pound or one ton, of any coal contains a definite, determinable number of British thermal units; and no device, contrivance or process of man can change this amount one iota. It is quite true, however, that the definite amount of heat evolved from the combustion of a pound of coal by one process may be more available, or recoverable in larger measure, than that resulting from the combustion of the same pound of coal by another process. Thus, if the coal contains 15,000 B.t.u. per pound, in one case 10,000 B.t.u. only might be absorbed; while in another, say, 12,000 B.t.u. might be utilized. This, however, is a question of heat absorption, not heat generation.

It is probable that much of the misunderstanding and misconception surrounding the utilization of pulverized coal arises from a confusion of heat volume with heat intensity. The average person has no more definite and exact idea of just what constitutes the difference between a British thermal unit and a degree Fahrenheit than he has of the distinction between a watt and a volt. To such a man a high-flame temperature may be quite easily, perhaps naturally, confounded with large heat yield from the fuel.

Workingmen everywhere rejoice when the industry they labor in is attacked for its prices, despite the fact that if their goods are bought for too low a price they must be produced by low wages. Where the prices charged are known to be fair, at least a decent neutrality might be expected. Furthermore, when one knows that a daily paper continually misrepresents one industry—one's own—it is safe to assume that it misrepresents other industries as well. Why therefore credit it?

THE LABOR SITUATION

EDITED BY R. DAWSON HALL

General Labor Review

A feeling has been prevalent that the British Columbian plan of advancing wages to accord with increased costs of living by an automatic provision embedded in the contract would not find favor with the mine worker. It is true it was not popular in British Columbia among the workmen, but it is also true that there is in western Canada a degree of unrest unparalleled, and apt to continue unparalleled, here.

In fact, had an automatic clause been introduced earlier it would have done much to delay the progress of sovietism in western Canada. Canada has gorged herself even more gluttonously than have we, with foreigners who do not understand her free institutions, do not know her language or appreciate her spirit. Many of our coal regions were well peopled with Americans before the mines were opened in them. There was thus a basis of Americanism on which to work. The civilization of the people in parts was, it is true, often quite backward. The mountains had shut them in and arrested their development. But they were of our kin; they spoke our language; they were fostered in the same traditions; they revered what we revere. As a result there is always a bedrock of conservatism that cannot be found in every instance in western Canada, where all is newer and where the percentage of foreigners is higher.

The adjustment of wages to prices is a cardinal point of justice. It should appear in every contract. Unionism makes it possible to adjust wages to meet the cost of living, and the operator should fully avail himself of that and of his happy opportunity to grant essential justice to his workmen without injury to himself. So long as wages were determined by private dicker he could not do this, but now that there is no competition among employers as far as wage is concerned (the matter of bonuses being overlooked) a price is bound to be obtained that will have a definite relation to the wage rate regardless of what that rate may be, high or low.

Difficulties of Mexican Oil Situation

The competition of Mexican and other oil does, however, introduce some uncertainties. Mexico is a country which is not necessarily affected by the same wage changes as the United States. It is an independent variable in many respects. However, the careful reader of *Coal Age* will remember that O. P. Austin showed (Vol. 15, p. 863) that price movements in Mexico are not altogether independent of like movements elsewhere. In fact, sisal grass, which rose in price 300 per cent. in four short years, exhibits the fact that Mexico is getting the full benefit of the world's changed conditions with some of its own added for good measure.

It must be remembered that Mexican oil is a menace in itself, and not merely a menace because it is produced by cheap labor. Moreover, Mexican oil is not the only source of concern. Our own oil, produced, as it is, by well-paid labor, is in the South causing much worry, whereas in the West western coal is triumphing over western oil. Still too much stress must not be placed on oil competition. Wages must be kept where they are, and even raised to meet increased living costs, when they occur, whether Mexican or other oil invades or does not invade the coal market.

A wage which rises and falls with cost of living is not a sop thrown to labor. Today it is one of labor's rights, whereas it was not a right a few years ago, because it could not be safely assured to labor so long as there was a free wage market, where some could concede it and others need not.

J. D. A. Morrow said at the meeting of the National Coal Association recently that a shortage of 48,000,000 tons of coal was imminent. Dr. Garfield has, it is said, approved that statement. Some say the national labor market is depleted by over 5,000,000 men already, that figure taking in consideration the loss from the cessation of immigration as well as the decrease in the labor force owing to the departure of those who for a time formed a part of our labor forces. According to Mr. Morrow we will lose 40,000 of our foreign coal laborers in the next year. A Wilkes-Barre paper recently stated that from that city and from Hazleton about 1900 workers were preparing to return to their native lands. Shortages like these are quite likely to cause a semi-panic in the coal industry as soon as the public becomes aware of the true situation. Its slowness to buy is making the alien restless and homesick.

The labor situation is everywhere quiet. On the Monongahela River the men, at the Seventh Pool coal mine, organized themselves on May 16 and marched through Greensboro. The mine had been closed down for some time. When it reopened it cut wages 25 per cent. The men demand the scale price.

Strike of Labor Temple Builders in Ohio

By a peculiar irony of fate, mine workers now know how it feels to be the victims of a strike, for the laborers doing the excavating work for the new $100,000 temple of the coal miners at Thirty-fourth and Belmont Streets, Bellaire, Ohio, went out on strike on May 15. As a result, the completion of the new building will probably be delayed for some time.

The men ask for $4.30 per day of eight hours. They have been working nine hours per day and receiving 40c. per hour. Fifteen men laid down their picks and shovels and left their work. Eight teamsters who were working on the job and receiving $1 per hour did not strike.

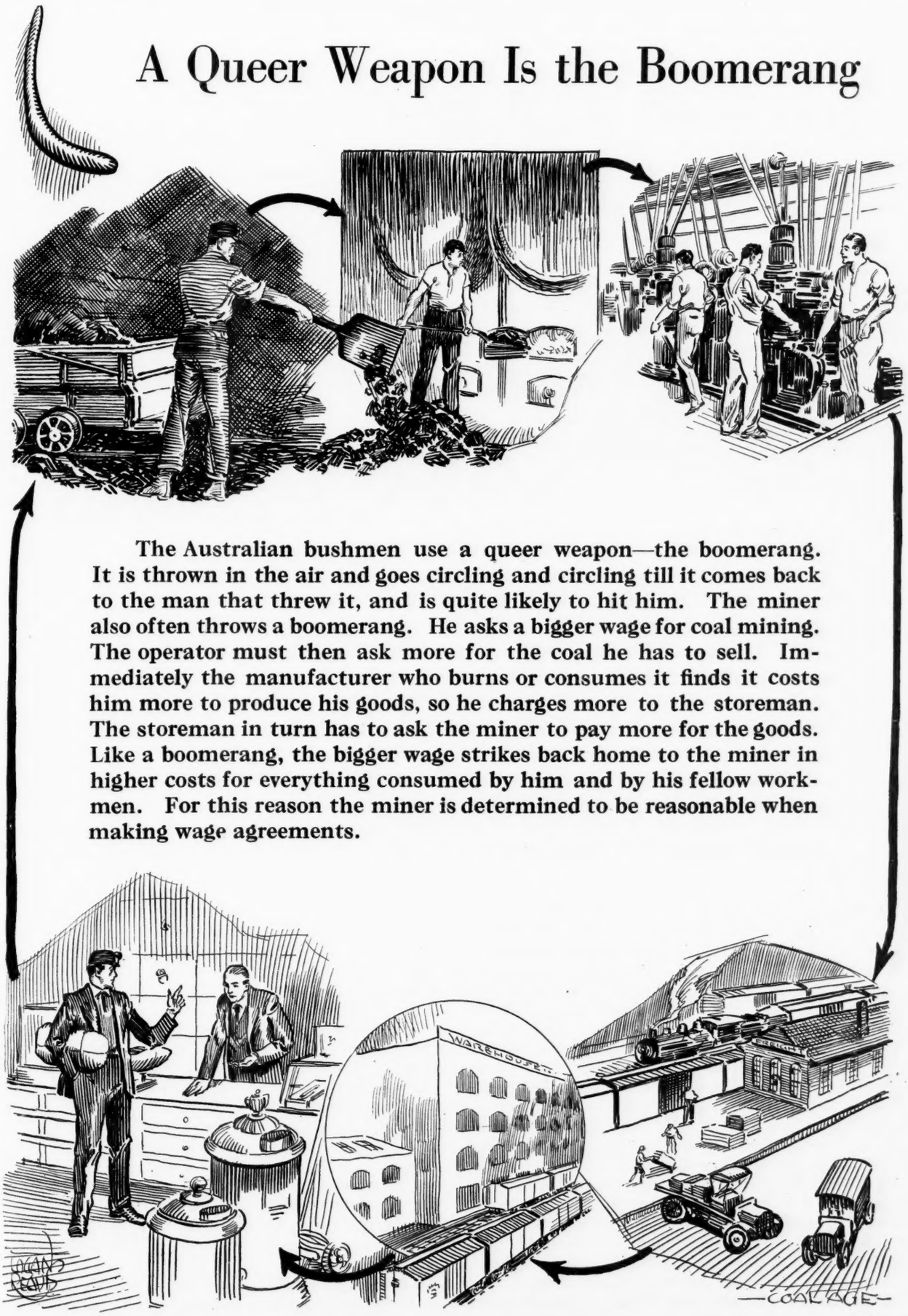
According to officials of the miners, members of coal miners' unions were to be given preference when men for the work were being secured and after that any man who was a member of a local union could be employed. The R. R. Kitchin Co., of Wheeling, was recently awarded the contract for erecting the temple. The contract calls for completion of the building in ten months from May 1.

Sympathy Strikes Violate Wage Agreement

Officials of the United Mine Workers of America have taken steps to end the strike of coal miners in the McAlester, Okla., district. About 380 miners quit work in sympathy with the striking electrical workers of the Texas Power and Light Co. and the Choctaw Light and Power Co., which furnish electric power for many of the coal mines and also for the homes of the miners. When the union men of the power and light companies walked out the electric companies employed nonunion men wherever possible. The coal miners claimed that the power companies were employing incompetent help and that their lives would be endangered in the mines if they continued to work under such conditions. Several of the largest mines in the McAlester district were forced to close down for a time, including the Rock Island Coal Co.'s mines at Hartshorne and the mine of the Osage Coal and Mining Co. at Krebs.

International officials of the United Mine Workers have telegraphed the leaders of the strike at McAlester, holding that the coal miners are working under the Washington agreement and that they cannot go on a sympathetic strike. All the men were ordered to return to work except in those mines where all equipment is electrically operated. All mines have resumed operation with the exception of Mine No. 10 of the Rock Island Coal Co. at Hartshorne.

A Queer Weapon Is the Boomerang



The Australian bushmen use a queer weapon—the boomerang. It is thrown in the air and goes circling and circling till it comes back to the man that threw it, and is quite likely to hit him. The miner also often throws a boomerang. He asks a bigger wage for coal mining. The operator must then ask more for the coal he has to sell. Immediately the manufacturer who burns or consumes it finds it costs him more to produce his goods, so he charges more to the storeman. The storeman in turn has to ask the miner to pay more for the goods. Like a boomerang, the bigger wage strikes back home to the miner in higher costs for everything consumed by him and by his fellow workmen. For this reason the miner is determined to be reasonable when making wage agreements.

DISCUSSION BY READERS

EDITED BY JAMES T. BEARD

Punishment of Intimidators

Letter No. 1—I read with interest the brief reference to the action of the Raleigh County Grand Jury, in West Virginia, which indicted 19 members of the District Local, for recent acts of intimidation at the mines of the E. E. White Coal Co., *Coal Age*, Apr. 3, p. 630. The announcement led me to reflect and wonder if those who think that the American Government is radically wrong in its methods of conducting its industries are not more pronounced in giving expression to their ideas than those who have greater faith in their government and believe that it is the best on earth.

A man who finds fault with existing conditions is entirely within his rights as long as his fault finding does not find expression in acts of violence and the intimidation of others. But, when it comes to the overturning of existing systems and authority, by a group of individuals, we face a revolution. Revolutions are justified only in rare instances and are, at all times, highly dangerous.

Under our republican form of government, the fellow who repudiates authority and strives to upset law and custom is either misguided or guilty of having wrong intentions. The high officers of the United Mine Workers of American have rightly advised all their locals against any concerted movement for a strike in behalf of "slackers" or "conscientious objectors." who have gotten themselves into jail by reason of setting themselves against the authority of the nation.

SUBMISSION TO GOVERNMENT ESSENTIAL

It is poor logic to think that one can support and uphold the Government and, at the same time, seek to enforce a demand for the release of any one man or group of men who have violated its laws and been thrown into jail to await their trial. Obviously, such a demand is a clear repudiation of the regularly constituted authority and must be so regarded. There are men of socialistic inclinations, though otherwise high-minded and regardful of law and order, who are led to support and favor the making of such a demand on their government. Such inclinations are akin to the socialistic tendencies that animate the I. W. W. and stand for revolution.

Certainly, a personal friend of a prisoner who is suffering for his acts of disloyalty or violation of law has a right to petition the Government for leniency or clemency in his friend's behalf. But, when it comes to a group of men making such a petition and accompanying it with a threat or act of intimidation, it is time for good people to get busy.

When established authority is not free to enforce law and order, and if its decrees are repudiated, there is no government worthy of the name. It is a pity that men of good intentions and kindly natures become blinded and fall victims to class prejudice that would lead them to support any movement that would subvert law.

Never was there greater need for law abiding citizens than today, when the future of our country depends on the overwhelming loyalty of the people who enjoy its privileges. The fact that German propaganda is at work to overthrow the peace and prosperity that we enjoy is sufficient argument for the full punishment for intimidators such as those indicted by the Grand Jury of West Virginia.

LOYALTY.

Clinton, Ind.

Waste of Coal

Letter No. 6—I was much interested in reading the letter by a Colorado mine foreman on this subject, *Coal Age*, Mar. 20, p. 544. As he intimates, in his letter, while there is undoubtedly much coal lost after it has reached the surface, a much larger loss occurs in the mine.

Briefly stated, the principal sources of loss of coal are the following: (1) The fine coal and slack produced in blasting and cutting the coal. (2) Coal left in mine pillars instead of being recovered. (3) Loss in loading at the tipple. (4) Loss in storage by reason of sizes being reduced and ground to dust. (5) Loss in transportation to market. (6) Loss by improper methods of firing. (7) Unburnt coal thrown away in the ash.

Now that the war is over we do not hear the cry so often raised during the past two and three years, "Save coal to win the war." It is to be hoped that the lessons learned in the conservation of coal and other supplies will not be forgotten. One of the most important of these lessons is the need of avoiding the waste of coal, particularly, in the operation of the mines.

In the letter to which I have referred, the foreman alludes to the waste in machine mining, because four or five inches of coal were left on the bottom. Where the floor is a soft fireclay, this bottom coal is often of great assistance in shoveling. It gives a smooth hard floor, quite different from the soft clay that makes the work of shoveling coal so often laborious. The trouble is much aggravated if the bottom is wet. However, four or five inches of bottom coal should not be left to be lost, but should be wedged up and loaded out as the place advances.

Where coal is underlaid with a dry clay bottom, the waste of bottom coal can be avoided by putting the mining or undercutting in the clay. In starting such a cut it is necessary to take up a sufficient thickness of the clay to lower the machine; but, after the first cut is made, this work will not be required.

The loss in pillar workings is often very great because of an improper method of drawing the pillars. It frequently happens that the pillars between rooms are too small and so badly crushed by the weight of the overlying strata that they cannot be drawn with safety. When this is the case what is needed is a better plan of driving the rooms. The distance between the rooms will have to be increased or the rooms driven at a less width.

All pillar coal should be removed as quickly as possible after the rooms have reached their limit, so as to avoid the drying out and the crushing of the coal be-

fore "robbing" is commenced. The most important consideration, in room-and-pillar work, is to see that the pillars are strong enough to withstand the weight of the overburden. C. McMANIMAN.

Rawdon, Quebec, Canada.

Barometer vs. Outflow of Gas

Letter No. 2—It is quite true, as E. P. Brennan has pointed out in his letter, *Coal Age*, Apr. 3, p. 634, that the indications of the barometer have an important bearing on the possible dangers that arise from the presence of gas in mines. In this country the variation of barometric pressure may range from 28 to 31 in. of mercury column, which corresponds to a range of atmospheric pressure from 1980 to 2192 lb. per sq.ft.

It has long been observed in coal-mining practice that an increase of gas in the mine air occurs at times when the barometer is falling, and it was common to accept the indications of the barometer as a gage of the relative safety of the mine atmosphere. A falling barometer is still generally accepted as a warning that calls for greater vigilance and the exercise of certain precautions to keep the mine workers safe.

It is quite generally agreed that the same change of pressure that causes the fall of the barometer results in the expansion of the air and gases pent up in the waste and abandoned places in mines. The expansion of this volume of gas-charged air causes an outflow of the same into the mine workings and endangers the lives of the men working in their places. The more sudden the fall in atmospheric pressure, the more observable the results that attend such a condition in the mine.

For example, only a few days ago, Sunday, March 9, the barometer fell 0.85 in. in 16 hours, causing a marked increase in the gaseous condition of many of our large mines having a considerable extent of abandoned areas. It is the sudden changes in barometric pressure that are more dangerous in their effect in the mines.

In England, it was the rule that the fireboss had to read the barometer every morning, before descending the mine shaft, and make that reading a part of his report. As Mr. Brennan has stated, "Mining men have been led to rely on the indications of the barometer," and I hope that this discussion will show how far it is safe to take barometric readings as a guide to safety in coal minig. TIMOTHY GOLDON.

Letter No. 3—Reading the letter of E. P. Brennan, which appeared in *Coal Age*, Apr. 3, p. 634, my attention was particularly arrested by one statement that read as follows: "Personally, I fail to see why a barometer when properly constructed should not adjust itself simultaneously with any change in the atmospheric pressure when that takes place."

In this regard let me state that a barometer certainly does adjust itself to every change in atmospheric pressure. However, there is a great difference between the sensitiveness of the mercury column of the barometer and the sensitiveness of a large volume of air and gases forming the mine atmosphere.

Owing to the greater sensitiveness of the air, the effect of any change in atmospheric pressure is more quickly felt in the mines, where an increase of gas may be observed some little time before there is an observable change in the height of the barometer. At the mines, we commonly speak of that instrument as the "glass."

Some years ago, it was the custom in England to issue daily warnings of the changes taking place in the barometer. These warnings were sent out from a central observatory, to all coal mines, to enable them to use greater precautions and watch all gobs and abandoned places for any undue discharge of gas into the mine workings. But such warnings were eventually discontinued, because it was found that they were quite generally received after the increase of gas in the mine had been observed. Nevertheless, the barometer is still regarded as an important item of equipment at all large coal mines.

Calculating Expansion of Confined Air and Gas

A simple calculation; based on the application of Mariotte's law, which makes the volume of air or gas vary inversely as the pressure, will show the effect of barometric changes. For example, suppose an old waste in a mine contained 50,000 cu.ft. of gas-charged air, and the barometer fell from 30 to 28.5 inches. The expansion of this volume would then be

$$28.5 : 30 :: 50{,}000 : x = 52{,}631 \text{ cu.ft.}$$

The volume of air and gas forced out into the mine workings, by reason of this expansion, is therefore 52,631 — 50,000 = 2631 cu.ft.

Owing to the far greater density of mercury, as compared with the gas-charged air in mines, it is only natural to believe that air and gas respond much more readily to a fall in atmospheric pressure than the mercury column of the barometer. Allow me, here, to illustrate this point by some actual observations showing the effect of changes of barometric pressure on air and gas in mines.

At the mine where I am at present employed, there are two pairs of entries that have been sealed off by means of a 12-in. concrete wall built in each heading. A 4-in. iron pipe equipped with a valve was built into each wall near the top. It is the custom to open these valves every day, to observe the pressure of the atmosphere contained in the enclosed space.

Barometric Effect Clearly Shown in the Mine

Some days when the barometer is low, having fallen during the night, a strong pressure is manifested when the valve is opened. At such times there will be such a strong rush of gas and air from the pipes that it is difficult to hold one's hand against the mouth of the pipe. At other times, when the barometer is high or rising, there will be little or no pressure manifest when the valve is open. There may even be a strong suction, drawing air from outside into the enclosed space behind the wall.

At times, I have observed a neutral condition, when air was neither discharged nor drawn into the pipe and, on my return to the surface, I would find that the glass was just on the point of changing. Indeed, I came more to rely on the manifestations of these valves than I did on the glass. There are many instances on record where gas has been observed flowing from the waste places into the mine workings long before such a condition was indicated by the glass.

On one occasion I recall that one of the valves continued to show a constant pressure behind the wall, irrespective of the changes in atmospheric pressure indicated by the glass. This was in strong contrast to the

manifestation of the valve in the other wall, which conformed with the action of the barometer.

When I mentioned this peculiarity to the officials of the mine, they explained the difference by saying that there had probably occurred a large fall in one of the rooms in that enclosure that had released a feeder of gas that continued to flow into the confined space and created a strong pressure that bore no relation to the pressure of the atmosphere. This explanation seemed reasonable, and, after a time, the excess pressure was relieved by opening the valves and allowing the gas to escape. Later, the manifestations became normal.

West Frankfort, Ill. GEORGE BOWKER.

Certification and Safety

Letter No. 4—I have been deeply interested in the discussion regarding the certification of mine officials and its relation to the safety of the mine. The letter signed "Essex" *Coal Age*, Apr. 24, p. 766, particularly arrested my attention, as the writer attempted to defend the illiterate practical man, and argued that he "should not be denied his place of service in a mine where the company or the operator has confidence in his ability to safely control the operations underground."

Allow me to say that, in my opinion, there can be no such person as an illiterate, practical man. It is impossible for me to conceive how a man who can neither read nor write can become a practical mine official.

Certainly, the practical mine foreman must know enough about arithmetic to enable him to measure air correctly and determine how much air he is getting for each man working on a split. He must be able to estimate what length of sidetrack will hold a given number of cars; or tell how many rails, ties, spikes, splice bars and bolts are required for a certain length of track. He must be able to scale distances from the mine map and determine the direction or bearing of any proposed heading, and do many other like things that require a simple knowledge of arithmetic, embracing addition, subtraction, mulplication, division, and decimals.

A Really Practical Man Will Study

It is my belief that a man who is intelligent and practical enough to be a mine official will be practical enough to learn to read and write and do simple arithmetic, and will have some knowledge of mine gases other than what he has been able to learn of them in the mine. Most of us can remember how the old practical miner used to tell us that he could detect carbon monoxide with his safety lamp; whereas, we all know that if enough of this gas was present in the mine air to detect it by the lamp it would cause instant death.

Practical men have often scoffed at the idea of a dust explosion resulting from a blownout shot; but the study of mine gases and dust explosions has made clear the danger arising from the accumulation of dust in working places where blasting is performed. By the study of gases, we find that firedamp mixtures tend to accumulate at the high points and in the rise workings of a mine, while blackdamp sinks to the lower places and collects in dip workings. This is because the former is lighter and the latter heavier than air, at the same temperature and pressure.

Even with my 28 years of experience in mines I would hesitate to accept the position of mine foreman at a mine, if I could not pass the written examination held in the bituminous districts of Pennsylvania. To accept of such a position without being certified as to my ability to fill it would cause me to feel that I was an impostor. I believe that a certified man realizes the dangers he must meet in the mine, because he has studied carefully the conditions surrounding the work. He is thoroughly acquainted with the requirements of the mining law. An uncertified man may have read over the law, but there is a difference betwen reading and studying the law.

By all means, then, let mine officials be certified as to their ability to fill the positions they hold. The study required to fit them for passing the necessary examination will develop their minds and teach them how to think, which is most essential in mining work where a man is often called to make a quick decision and display good judgment at the same time.

On the other hand, all learning and no experience in practical work is as bad as having years of practical experience with no knowledge of theory. The five years required by law seems a short time for a man to become a practical mine foreman. It is my belief that he should be at the face, mining coal, for at least two years, and the balance of the time be employed at general labor in the mine.

In closing, let me say that workers, as a rule, have no respect for the uncertified man. Neither do they regard the certified man if he has had little or no practical experience in mines. I have formed this opinion from my own observation in such cases, which convinces me that a foreman must be able both to tell a man how to do a certain piece of work and to give him all necessary instructions if he fails to understand.

Midway, Penn. W. J. LYKE.

Letter No. 5—Carelessness and indifference about the mine is claiming an awful toll on the lives of mine workers. If the Coal Mining Institute of America, the members of which are said to have discussed the subject of the certification of mine officials in its relation to safety in mines, could not reach a definite conclusion in respect to this matter, it is to be hoped that such will not be the case with the readers of *Coal Age;* but that the opinions expressed in these letters will be overwhelmingly against the employment of uncertified men as mine foremen in our mines.

In considering this question, I have not been able to understand, nor has anyone explained to my satisfaction, how an intelligent body of men, such as our legislators should be, could annul the requirement of the law making certification of mine foremen necessary. Why did they not go a step farther and throw down the bars completely, by rescinding the law requiring the state examination of mine inspectors. It would then be possible for any old politician to be a successful applicant for that office, and the mines would go to smoke.

It frequently happens that the first question asked on a mine foreman's examination is one that reads somewhat like this: "What is the principal purpose of the law requiring the employment of a practical and competent mine foreman?" This question shows that the body of men constituting the examining boards in Pennsylvania realize the necessity of passing, in the examination, only those who prove their ability and show by their answers that they are both practical and competent in respect to the safe and economical operation of a coal mine in their charge.

Allow me to quote briefly from the bituminous mine law of this state: Art. 4, Sec. 1, reads as follows:

> In order to secure efficient management and proper ventilation of the mines, to promote the health and safety of the persons employed therein, and to protect and preserve the property connected therewith, the operator or the superintendent shall employ a competent and practical mine foreman for every mine where ten or more persons are employed.

No one will deny that this was a sane and sensible act, worthy of men of high ideals and aspirations, whose chief thought was to protect the lives and property of those concerned. Now, for another body of men to pass an act allowing any operator or superintendent of a mine to employ an "equally competent man" makes one think that the legislators were unduly influenced by those whose self-interests were the first and strongest consideration and with whom the safety of the mine workers was a matter of minor importance. It is about what we might expect if a farmer was to undertake to operate a mine. When I think of it, I cannot call to mind a single man who is capable of running a mine and not capable of passing an examination for a certificate of competency before a regularly constituted mining board.

A Mine Hopelessly Ruined by an Uncertified But "Equally Competent" Foreman

Sitting here, at my desk, I can see a mine whose history and condition today is one that furnishes an illustration that should convince the most skeptical in regard to the need of the certification of mine officials. The superintendent of this mine is a man who knows nothing of practical mining and who hires the "equally competent" men to run it for him. In the operation of this mine, mining laws and regulations have been ignored, entry stumps have been robbed to such an extent that a squeeze or creep started.

In one instance, six miners, a driver and his mule were all working under a rock that, to look at it, would cause one's hair to stand on end. The rock had been cut off on both sides and the props supporting it were broken with the weight. The mine has now been shut down by order of the state inspector, and the entire equipment has gone to ruin so that it is doubtful if the opening will ever be operated again.

Coal Mining a Hazardous Occupation

The mining of coal is not a farmer's job, but one of the most hazardous of occupations. In coal mining, therefore, the slightest deviation from the most rigid laws and regulations should not be tolerated. This is not the time when we can be slack in respect to our duty of protecting men and property.

Considering the number of men employed in our mines who do not understand the first principles of mining, and the many who cannot speak or understand the English language, it behooves the state to pass laws that will provide for educating mine workers and protecting them by compelling the employment of competent men to take charge of the work.

Every effort must be made to teach mine workers to protect themselves; but this cannot be done when coal operators are willing to employ bookkeepers, barbers, store clerks, and other incompetent men as mine officials. It is time that operators began to play "safety first" in the operation of their mines.

Osceola Mills, Penn. S. D. Hainley.

Prime Producer in a Coal Mine

Letter No. 1—The inquiry that appeared in *Coal Age*, Apr. 3, p. 637, asking who is the "prime producer" in the coal industry, will no doubt bring forth a variety of opinions. For myself, I must beg to differ with the inquirer who is of the opinion that "the actual producer is the loader who takes out from 8 to 12 lb. of coal each shift."

There are many different employees engaged in the work of producing coal and putting it on the market. First, there is the miner who liberates the coal from the strata, loads it into his car and sends it out of the mine. There is no question but that the miner is at the beginning of the production. He is the first man on the long list of drivers, motormen, trackmen, timbermen, cagers, engineers and bosses. However, if I may be permitted to put it that way, I would call the miner the "primary producer."

All the employees engaged in the work contribute their share in the production of the mine; but none of them can justly be called the *prime* or chief producer. All are busy workers, performing their duty in order, and assisting in the movement of the coal from the face to the tipple; but they are all dependent each on the other. To my mind, the man in charge, who commands and directs the work of all is the main spoke in the wheel. In my opinion, he is the chief and the *prime producer*.

It is true, of course, that the wages of all these workmen and the profits of the company besides, come from the point of the pick. But, it must be remembered that, in order to insure the greatest degree of perfection in the entire work, there is required one great head.

As I look at this question, the words "prime producer" mean far more than the first man on the list, or the miner who wields the pick. The words appear to me to embrace the higher meaning of getting the greatest yield, from a given area, in a given time and with the least expenditure of money and labor. On this basis the man in charge of the operation is the prime producer. J. T. Jones.

Rossiter, Penn.

Surveying Without an Instrument

Letter No. 1—I am tempted to offer a few comments on the article of T. Edwin Smith, *Coal Age*, Mar. 27, p. 562, suggesting the idea of making a mine survey when no instrument is available for that purpose and the only means at hand is a steel tape. In his description, Mr. Smith speaks of "lining in" two points on a section line, after locating one stake a quarter of mile and another a mile and a quarter away, on said line.

It would be interesting to know how any one would place any reliance on the subsequent work of a survey started in this manner. How is it possible to line in the two points that he mentions, at distances 20 ft. apart on the section line, or to project that line, without the use of an instrument.

The method described for finding the angle that a line, drawn from one of these points to another point located at the mouth of the mine, makes with the section line, is simple and would suffice for turning an angle or two in case of necessity. But, to apply this method for connecting a mine survey with the section line on the surface is certainly open to criticism.

If the three points used to represent the apices of the triangle happen to be ½ or even ¼ inch off their respective lines, there would result a grievous error in the survey projected from this triangle as a starting point, or employed to determine the course or bearing of the first line of the survey. Should one or both of these points be slightly off the true line, the error in the location of the stake at the mine entrance would probably be greater than the permissible error of any ordinary transit survey extending through a 2-mile circuit.

At the close of his article, Mr. Smith suggests that a steel tape stretched close to the ground is but slightly affected by a high wind that would render the observations taken with a transit unreliable. It is my experience that chaining or measuring in a high wind is a greater source of error than sighting through a transit, under the same conditions. I believe that practically all of the errors in surveys made in high winds can be attributed to chaining, and very little to the effect of the wind on the instrument.

There is no doubt, as Mr. Smith remarks, that "the accuracy of the results will depend upon the care taken in sighting the lines and measuring distances." This is true of all survey work, and it does not appear that the care to be taken is an argument in favor of the proposed method, more than when using an instrument in making a survey. Indeed, I will say that the most extreme care is needed, in the alignment of points without the use of an instrument for that purpose. An error of ¼ inch in a distance of 20 ft. makes an angular error of 4 minutes, which exceeds the allowable error.

Piney Fork, Ohio. F. C. SANNER.

Efficiency in Mine Management

Letter No. 5—The letters that have been written dealing with the question of efficiency in the management of mines have apparently neglected to mention one or two vital points in practical management. In order to secure the highest efficiency in any operation, it must be studied in detail.

In coal mining, one must start his investigation from the time the coal is taken from the working face until it is dumped over the screens on the tipple, ready to be shipped to market. By a careful survey of the situation, it will be found that, while negligence begins at the working face, the real fault can generally be traced to the failure of the management to choose men who are capable and trustworthy.

EMPLOY COMPETENT MEN WITH FULL AUTHORITY TO ACT

Success depends on employing only such competent men and giving them the authority they need to enforce discipline in the mine, and then holding them responsible for getting results. If it can be shown that men in charge of work are not fitted for such responsibilities as should be theirs, I would ask, "Why should they be retained on the payroll?"

Allow me to refer briefly to at least two items that are by no means uncommon in the management of coal mines, and yet interfere seriously with the highest efficiency attainable in the work. One of these items is the frequent derailment of cars in mines. This is most observable, in my experience, in machine mining where short rails or "jumpers" are used so as to enable the cutting machine to pass freely across the face, without interfering with the roadway. Several years of experience, in the movement of coal from the face to the tipple, enables me to give a close estimate of the number of derailments that are liable to happen.

Say, for instance, from 8 to 10 cars are taken from a single working place, daily. My observation is that an average of one of these cars a day will be derailed as the result of improper discipline on the part of the men in charge and for whom the management are responsible. Consider, for a moment, what this condition means, in a mine employing 400 loaders. All must agree that it will mean a marked decrease in the daily tonnage, to say nothing of the dissatisfaction of drivers, motormen and loaders, all of whom are delayed by reason of such derailments.

I recall to mind a particular instance where a motor, hauling a train of from 6 to 8 cars at a time, was compelled to pass over a switch not more than 7 ft. in length. To my remark that the switch should be twice that length, the partingboss replied that "a man in the office figures all those things by direction of the manager." But practical mining men know that such a length of switch can only be used in mule haulage, and will result in no end of delay in motor haulage.

UNPRACTICAL WORK CHARGED TO OFFICE MEN

In the instance just mentioned, the same figures were applied to all switches in the mine, whether in rooms or on the main parting. Such a condition does not speak well for either the technical or practical knowledge of "the man in the office," or yet for the efficiency of the management that employs him. Attention being drawn to such a matter in a mine invariably brings the reply, "Yes, I know it; but the manager won't stand for anything else, and I must do what he says."

While I do not wish to be understood as suggesting that an under official should go contrary to the orders of the management, I will say that too many under officials accept orders that they know are not practical, without making any attempt to explain the conditions that call for something different.

The cost-sheet is the one thing that is ever before the eyes of the manager, and it is not to be supposed that he is always acquainted with the conditions existing underground. On this account it is all the more important that an efficient management should employ competent men to place in charge of that work, and hold them responsible for the results, allowing them to have complete charge of all construction and repair work.

Unless this is done, the man in charge seldom feels free to do anything but what he knows will meet the approval of the management, and the entire responsibility for the result then lies at the door of said management, because full authority to act in accordance with one's practical experience has not been given, and the man is simply endeavoring, in a blind way, to carry out what he supposes to be the ideas of the management, imperfect and unpractical as they may seem to him to be.

In closing, let me say that it is difficult to understand how companies will employ men to take charge of their work, whom they assume to be incapable of independent judgment and action. Their chief aim and object should be to employ only men having a practical knowledge of coal, haulage, tracklaying, timbering and the handling of men, if they are to get results.

Edwardsville, Ill. CLAUDE W. CARRUTH.

INQUIRIES OF GENERAL INTEREST

ANSWERED BY JAMES T. BEARD

Lamp Extinguished by Gas at Roof

I want to ask for an answer, through the columns of *Coal Age*, to the following question, which has caused some considerable discussion hereabouts:

When making the morning examination in a mine, the fireboss came in contact with a fall of roof on a main heading. The fall left a large pothole extending 8 ft. up in the roof and 6 ft. wide. On raising his lamp up into the hole, the fireboss first observed that the flame became dim and on raising it higher, the lamp was instantly extinguished.

Assuming that the air in this hole was stationary, although the normal current was traveling in the heading, I want to ask what was the cause of the dimming of the lamp flame and its later extinction when raised higher in the hole? An answer to this question in *Coal Age* will greatly interest others beside myself who are constant readers of the paper. STUDENT.

Pryor, Colo.

This question illustrates a situation that has often been explained in *Coal Age*. It is reasonable to assume that some gas is being driven off in the roof strata broken by the fall. The air current not being directed into this cavity, the gas accumulated and more or less filled the hole. Diffusion taking place in the lower portion of the hole, the gas passes off in a thin stratum at the roof, practically as fast as it issues from the strata.

The dimming of the lamp when raised into the hole would indicate that some carbon dioxide is mixed with the methane coming from the strata. This is not an uncommon occurrence in coal formations. At times, the carbon dioxide exists in the strata, but more frequently it has found its way there from adjoining workings or from an overlying, abandoned and worked-out seam.

It is possible for the carbon dioxide, accumulated in old workings that have been sealed off, to find its way through crevices in the roof strata where it becomes mixed with methane and issues into the live workings as a mixture of these two gases. Such a mixture, formed in the absence of air, is lighter than the air (sp.gr. 0.924) and will tend to accumulate in the upper portion of the hole where it issued from the strata. Its diffusion into the air current will be comparatively slow, because of its density so nearly approaching that of air.

When a lamp is raised into such a mixture of methane and carbon dioxide the first effect is a slight dimming of the flame, which takes place as the fresh air in the lamp is being displaced by the mixed gases. A close observation of the flame when the lamp is first raised into the mixture will reveal a small flame cap, which quickly disappears, however, as the flame dims. A little later the lamp is extinguished by reason of the combustion chamber of the lamp being completely filled with the extinctive mixture.

Owing to the brief appearance of a flame cap when the lamp is first raised into the gas, this mixture of carbon dioxide and methane has been called "flash-damp." Although the mixture has not sufficient air to enable it to support combustion, it becomes inflammable and explosive and may be highly dangerous when mixed with air in sufficient proportion. (*Mine Gases and Explosions—Beard, pp. 128, 129*).

Helium

Kindly describe the occurrence, properties and uses of helium, and state what is its chief source of production? STUDENT.

Washington, D. C.

Helium is a light gas, being only twice as heavy as hydrogen; chemical symbol, *He;* specific gravity, 0.139; occurrence very rare. It was first discovered in the spectrum of the sun, whence its name from the Greek *helios*, sun. It exists in extremely minute quantity in the atmosphere and in a few rare minerals, such as uranium, titanium, columbium, etc.

Its chief importance was discovered in the late war when a light non-inflammable gas was sought to replace hydrogen in observation balloons and dirigibles. The gas fields of southern Kansas, Oklahoma and Texas furnish the only supplies of helium for commercial use. The gas coming from these fields was formerly known as "wind gas," because it could not be ignited, and was wasted until the search for helium showed it to contain from 0.5 to 2 per cent. of that element.

Power Transmission

It is proposed to operate a pump located at a distance of 1300 yd. from the power station, and it is estimated that it will require 23 hp. to drive this pump. Kindly state what size of cable will have to be used to transmit the necessary power in this case. SUPER.

Collinsville, Ill.

Assuming 90 per cent. of efficiency in the motor driving the pump, the power delivered at the motor must be (23 x 746) ÷ 0.90 = 19,065 watts. Then, supposing the pressure at the terminals of the motor to be 250 volts, the current necessary to be transmitted is 19,065 ÷ 250 = 76 amps.

Finally, allowing for a 15 per cent. line drop, the size of wire required to transmit this current from the power station to the motor, assuming a wire return, will be that having a sectional area, in circular mils. calculated thus:

$$A = \frac{21.6 \times 3(1300)76}{250 \times 0.15} = 170{,}7000 \ circ.mils$$

Reference to a wire table for the transmission of electric current shows that a 000-wire will be required for this transmission, under the assumed conditions.

EXAMINATION QUESTIONS

ANSWERED BY JAMES T. BEARD

Miscellaneous Questions

(Answered by Request)

Ques.—In a certain shaft, the weight of the empty cage is 2½ tons, the empty car ¾ ton, loaded car 2½ tons, and the rope hanging in the shaft 2 tons; what should be the small diameter of conical drum when the large diameter is 28 ft., in order to equalize the load on the hoisting engine?

Ans.—To equalize the load on the engine, the net load moment at the beginning of the hoist must equal that at the finish. The load moment is the product of the load on the rope at the drum and the drum radius. The net moment is the difference betwen the load moments of the empty and loaded cages.

At the beginning of a hoist, the loaded cage is at the shaft bottom and the empty cage at the top. The total load hoisted is the sum of the weights of the cage, loaded car and the rope, or $2\frac{1}{2} + 2\frac{1}{2} + 2 = 7$ tons, which acts on the small radius, or diameter (x) of the drum; and its moment is $7\ x$ ton-ft. But the descending load, starting at the top of the shaft, is the sum of the weights of the cage and the empty car, or $2\frac{1}{2} + \frac{3}{4} = 3\frac{1}{4}$ tons, acting on the large radius or diameter of the drum; and its moment is $3\frac{1}{4} \times 28 = 91$ ton-ft.

The net load moment, at the beginning of a hoist is, therefore, $7\ x - 91$ ton-ft.

At the end of the hoist, however, the loaded cage is at the top of the shaft, and the empty cage at the bottom. The total load acting on the large radius is now the sum of the weights of the cage and loaded car, or $2\frac{1}{2} + 2\frac{1}{2} = 5$ tons, and its moment, using the diameter instead of the radius, $5 \times 28 = 140$ ton-ft. The empty cage being now at the shaft bottom, the total load acting on the small radius is the sum of the weights of the cage, empty car and the rope, or $2\frac{1}{2} + \frac{3}{4} + 2 = 5\frac{1}{4}$ tons, and its moment referred to the diameter as before, is $5\frac{1}{4}\ x$ ton-ft.

Hence, the net load moment at the end of a hoist is $140 - 5\frac{1}{4}\ x$ ton-ft.

Finally, equating the net load moments at the beginning and the end of a hoist, and solving the equation for x, gives for the small diameter of the drum, in this case, in order to practically equalize the load on the engine throughout the hoist,

$$7\ x - 91 = 140 - 5\frac{1}{4}\ x$$
$$12\frac{1}{4}\ x = 231$$
$$x = 18.85 \text{ ft.}$$

Ques.—Why, in mines worked exclusively with locked safety lamps, are explosions less frequent than in mines worked by open lights? State fully.

Ans.—It may be assumed that where the conditions in a mine are such as to require the exclusive use of safety lamps, greater precautions are taken to avoid the dangers due to the presence of gas, than in a mine where open lights are permitted. The greatest danger exists in mines where mixed lights are used. A mine worked exclusively with open lights must be assumed as being one in which gas has never been discovered. The men working in such a mine are mostly those who have no knowledge of gas and exercise no care to avoid possible dangers from that source. The mine may still be generating a little gas, which has escaped detection by reason of the place being well ventilated. A time of idleness or slack ventilation would then bring danger, unless the workings were thoroughly inspected before the men were allowed to proceed to work.

Ques.—When is a mine efficiently ventilated?

Ans.—The ventilation of a mine is efficient when it complies with every requirement of the mining law and the air is distributed about the mine in such a manner as to prevent any dangerous accumulation of gas in the working places and elsewhere in the mine, and the mine atmosphere is thus made safe and healthful.

Ques.—In selecting an explosive for blasting purposes in a mine what are the chief considerations?

Ans.—The chief considerations relating to the choice of an explosive for blasting coal and rock in mines, are the volume, duration and temperature of the flame produced in its explosion; susceptibility to moisture and freezing; and its strength and adaptation to the material to be blasted.

Ques.—If the mine resistance produces a 2¼-in. water gage, when the depression at the port of entry of the fan is 2 lb. per sq.ft., the area of the port of entry being 90 sq.ft., and the area of the port of discharge 65 sq.ft.; what is the manometric efficiency of the fan?

Ans.—The solution of this problem depends on the principle that, for the same quantity of air passing, the pressure varies inversely as the square of the area of passage. The first step is to find the total pressure absorbed in the fan. The intake area or port of entry of the fan being 90 sq.ft. and that of the discharge 65 sq.ft., the area ratio intake to discharge is 90: 65. Then, the intake pressure being 2 lb. per sq.ft. and calling the discharge pressure x, the pressure ratio, intake to discharge, is $2 : x$. But, by the principle just stated, the pressure ratio is equal to the square of the inverse area ratio, and we can write:

$$\frac{x}{2} = \left(\frac{90}{65}\right)^2 = 1.92$$
$$x = 2 \times 1.92 = 3.84 \text{ lb. per sq.ft.}$$

The total pressure required to pass the air through the fan is, therefore, $2 + 3.84 = 5.84$ lb. per sq.ft. But, the total pressure absorbed in the mine, as indicated by the water gage of 2¼ in., is $2\frac{1}{4} \times 5.2 = 11.7$ lb. per sq.ft. In this case, the total pressure producing the circulation in the mine and the fan is $11.7 + 5.83 = 17.53$ lb. per sq.ft.

Finally, since the manometric efficiency of a fan is the ratio of the pressure absorbed in the fan to the total pressure producing the circulation through the mine and the fan, expressed as percentage, it is, in this case, $(5.83 \times 100) \div 17.53 = 33\frac{1}{3}$ per cent.

FOREIGN MARKETS AND EXPORT NEWS

EDITED BY ALEX MOSS

Exemption of Transportation Tax on Export Coal

Many complications have developed to delay the Bureau of Internal Revenue in making an announcement in the matter of allowing exemptions from the payment of the transportation tax on export coal. The following regulations, however, have been submitted to the bureau by the American Wholesale Coal Association with the hope that they may be acceptable:

Any shipper intending to ship any commodity to any foreign country shall file with the carrier a sworn certificate containing the following information: (1) Character and amount of commodity to be exported; (2) name of the port through which the export shipment is expected to be made; (3) name of the country to which the shipment is to be made; (4) approximate dates between which the export shipments are to be made.

Upon receipt of such information, the carrier shall exempt such shipper from the payment of any transportation tax which is provided by law and intended to apply on domestic shipments. Provided that such exemption shall be considered temporary until the shipper has supplied to the nearest agent of the carrier the following data in proof of the fact that the commodity has actually been shipped into export:

a. A full copy of the foreign bill of lading containing: (1) The character and amount of the commodity exported; (2) the name or number of the conveyance used in exporting the commodity; (3) the city and country to which the shipment is destined.

b. Or a certificate containing: (1) Reference by number to the waybill or foreign bill of lading; (2) character and amount of commodity; (3) city and country to which shipment is destined.

When proof of export is thus presented, the exemption from the payment of the domestic tax on transportation shall become permanent. When there is any discrepancy between the amount originally declared to be destined for export and the amount actually exported, the exemption from the payment of the transportation tax shall be for the amount actually exported.

When the shipment is made through a pool, it will be sufficient for the purpose of proving exemption to show the amount actually exported is equal in quality and quantity to the sworn stipulations in the original declaration of intention to ship into export.

Disposition of Saar Coal Region

According to a recent issue of the *Iron and Coal Trades Review* (London) the following are the particulars regarding the settlement of the ownership of mines, etc., in the Saar Basin, which is the decision of the Council of Four:

The ownership of the mines is transferred to France in perpetuity, and the mines are to come under the provisions of the French laws. Germany, however, is to continue to be responsible for all liabilities incurred by her to the inhabitants of the country in so far as the rights of these people are not recognized by the French laws. France will exercise police functions in the district. The political sovereignty, however, will be assumed by the League of Nations, who will give a mandate to a kind of directory, consisting of five members, one of them an inhabitant of the Saar district, one a Frenchman, and the other three members are to be appointed by the League. The inhabitants of the Saar district will retain all their political rights concerning elections to local representative bodies, but will cease to send representatives to the German Parliament.

This régime will last 15 years, at the lapse of which period a plébiscite is to decide the future political status of the inhabitants of the region. In the case that they should express a wish to remain under the administration of their country of origin, Germany will have to buy up the mines for France, who will be granted their full ownership in recompensation for the damage done by the enemy in the Département du Nord. The estimated purchase price will have to be paid in gold or equivalent securities.

Foreign Coal Trade Opportunity

A firm in Belgium desires to get in touch with American producers of bituminous coal. Correspondence should be in French. References. Those interested may procure further details by addressing the Bureau of Foreign and Domestic Commerce, Washington, D. C., or any or its branch offices, and referring to File No. 29366.

English Coal Market

The London coal market is gradually resuming normal conditions, says *The Colliery Guardian* of May 2. Seaborne arrivals have been fairly maintained and inland truck trade is improving. However, weather conditions and the wholesale arrears of orders on hand keep all business of a hand-to-mouth description. Domestic coals are in strong demand, and all manufacturing coals are keenly wanted.

There are larger supplies of coal for shipment from the Tyne for neutrals this month. Deliveries from Yorkshire are coming through more freely. The mines have now got into full swing, but it will probably take some weeks to overtake the arrears arising from previous low production. Supplies have improved in Lancashire, although restricted by the holidays, but there is a scarcity of domestic coal.

Outputs of coal at Cardiff are not yet up to the normal standard, and there has been a falling off in shipments. Operations are limited by the working conditions, but it is not improbable there will soon be great improvements in the supplies to meet the heavy demands.

Coal Shipments to Switzerland

On May 19 the War Trade Board announced that henceforth shipments of coal to Switzerland may be consigned to the Societe Coöperative Suisse d'Importation du Charbon, and furthermore that it is no longer necessary for importers in Switzerland to obtain certificates from the Societe Suisse de Surveillance Economique covering such importations. Applications on form X-A should be filed with the War Trade Board, Washington, D. C.

Brazilian Coal Imports During February

Vice Consul A. I. Hasskarl, of Rio de Janeiro, reports that arrivals of coal from all sources at this Brazilian port during February amounted to 43,179 metric tons (1 metric ton equals 2,204.6 lb.), of which 38,099 tons were American, and 5080 tons British, coal. The United States furnished 2138 tons in February, 1918, and 47,039 tons in the corresponding month in 1917.

Foreign Freight Rates

W. W. Battie & Co.'s coal trade freight report of May 19 states the following:

Since our last report, three large steamers were chartered to carry coal to ports in Brazil, and we have additional steamers open for such business; also have sailing vessels inquiring for coal to Brazil and the Plate at the chartering executive's rates.

There is very little demand for steamers to carry coal to West Indian ports, and shippers have been trying to arrange with the chartering executive to reduce freight rates (but without success), as such a reduction would help this business materially.

We have a number of steamers inquiring for coals to European ports, and think in the near future we will be able to secure tonnage for Genoa at $26.50, 1000 tons discharge, and Gothenburg, same terms—this gross form charter, freight in advance, no deduction.

The chartering executive's rates are as follows:

Steam—Havana, $7.50, 600 tons dis.; Cardenas or Sagua, $9. 300 tons dis.; Cienfuegos, $9, 500 tons dis.; Caibarien, $9.50, 300 tons dis.; Guantanamo, $8.50, 500 tons dis.; $9, 400 tons dis.; Manzanillo, $9.50, 300 tons dis.; Bermuda, $9.50, and Bermuda, p. c. and dis. free, 300 tons dis.; Kingston, $9.50, 400 tons dis.; St. Thomas, $10, 500 tons dis.; St. Lucia, $11, 500 tons dis.; Santiago, $8.50, 500 tons dis.; $9, 400 tons dis.; Barbados, $11, 500 tons dis.; Port of Spain, Trinidad, $11, 500 tons dis.; Curacao, $10.50, free p. c. Curacao, 500 tons discharge. Rio, $19.50 net, 1000 tons dis.; Santos, $19.50 net, 1000 tons dis.; or $21 net, 600 tons dis.; Rio Grande do Sul, $22, 500 tons dis.; Buenos Aires or La Plata, $18.50 net, 1000 tons dis.; Montevideo, $19.50 net, 750 tons dis.; Pernambuco, $18.50 net, 500 tons dis. Bahia, $18.50 net; Bahia Blanca, $20, 1000 tons dis. To Nitrate Range, $16.50 gross prepaid.

Sail (maximum) — Para, $15.50 net; Bahia, $18.50 net; Pernambuco, $18.50 net; Rio, $19.50 net; Santos, $19.50 net; Rio Grande do Sul, $20.50 net, 400 tons dis.; Buenos Aires, $18.50 net; La Plata, $18.50 net; Montevideo, $19.50 net. To Nitrate Range, $16.50 gross, prepaid.

Hampton Roads Coal Exports

NORFOLK

			Cargo	Bunkers
Lamberts Point				
May 13	Amer. S.S. Baxley	Bahia, Brazil	2,794	300
May 14	Amer. S.S. Lake Galera	Havana, Cuba	3,072	414
May 14	Amer. S.S. Hampden	Rio de Janeiro, Brazil	6,747	1,648
May 14	Amer. S.S. Achilles	Cristobal, C. Z.	11,331	1,152
Sewalls Point				
May 13	Am. Sch. Salem	Para, Brazil	1,249	...
May 15	Am. Sch. Mabel Gale	Para, Brazil	1,140	...
May 17	Am. S.S. Munplace	Havana, Cuba	4,495	439
Newport News				
May 10	Amer. S.S. J. L. Luckenbach	Rio de Janeiro, Brazil	5,176	1,607
May 10	Amer. S.S. Hattie Luckenbach	Rio de Janeiro, Brazil	5,468	....
May 12	Amer. S.S. Lake Annette	Havana, Cuba	2,592	285
May 13	Amer. S.S. Waukesha	La Plata, A. R.	2,532	1,113
May 15	Amer. S.S. Munaires	Havana, Cuba	7,032	....
May 15	Am. Sch. Pusey Jones 4	Puerto Plata, S. D.	488	....
May 16	Amer. S.S. Lake Kyttle	Havana, Cuba	2,578	114
May 17	Amer. S.S. Cranenest	Callao, Peru	2,563	306

COAL AND COKE NEWS

Harrisburg, Penn.

Senators and representatives from all sections of the state are being stormed with letters and telegrams protesting against the Mangan bill which reduces the standard weight of anthracite coal from 2240 to 2000 lb. The bill, which slipped through the House with scarcely any attention, is backed by the anthracite coal operators and retail coal merchants, and was introduced by Mr. Mangan, according to his statement, at the request of the wholesale and retail coal dealers of Allegheny County. Most of the letters received were from the eastern section of the state, and the protestants pointed out that the bill was sponsored by western interests where comparatively little anthracite is used.

Representative Mangan states the bill is justified by western Pennsylvania conditions, and he produced letters from coal dealers to prove his point. He also said that it was impossible to punish coal dealers who collected the price of a long ton for a short ton of coal, because the present law specifying that anthracite coal shall weigh 2240 lb. to a ton carries no penalty for violations.

Under existing legislation 2000 lb. to a ton is the standard weight of bituminous coal. Coal dealers complain that when they price anthracite at say $7.45 a ton of 2240 lb., some dealers quote the net ton of 2000 lb. at $6.65. This price, dealers complain, appears less, but actually is the same price per hundred weight. The general public, the dealers say, do not understand this and therefore place orders with the dealers who appear to be selling at reduced prices.

The Mangan bill imposes a penalty of $50 for each violation of the provision that coal shall be sold at a standard weight of 2000 lb. The bill is now in the Senate, where it is understood, an effort will be made to amend it, bringing the standard weight up to 2240 lb. While the bill will make little difference to miners who are paid by the car, it will benefit those who are compensated by weight.

Compensation amendments proposed by the state administration bill were given a hearing before the Senate judiciary general committee on May 20. After all the arguments were heard, the attorney general said there were only slight differences. General Schaeffer summed it up by saying that in the main features it was similar to a question of 50 per cent. of $24 dollars or 60 per cent. of $20. Henry W. Moore, of Philadelphia, speaking for the Manufacturers' Association discussed the medical charges and waiting period; Henry I. Wilson, speaking for the Central Pennsylvania Coal Operators' Association, objected to the payment to widows after remarriage as "establishing a peculiar precedent"; also noting the provision for supervision of payments to dependents, by the State Board. He suggested that guardians should be named. Evan C. Jones, of Wilkes-Barre, representing the anthracite interests made objection to the plan for determination of wages on a basis of gross earnings without deducting supplies and labor in anthracite mining as "an untrue" basis, and to the method of determination as involving too much search.

F. M. Painter, speaking for the Pittsburgh Coal Operators' Association, suggested changes in procedure, one being that agreements be altered as of the time when status changed; no awards be made on incompetent testimony; notice of appeals to court be given by appellant and that courts be empowered to dispose of cases instead of returning them to the State Board for review.

The interests were represented by James H. Maurer, president of the State Federation of Labor, Thomas Kennedy, head of the mine workers of the Lehigh field and Roger Devers, counsel for the mine workers. They asked that if the present amendments were not acccpeted, to let the present law stand as it is.

It developed at the meeting that if the employees were given an advance in compensation at the present session, that, if conditions warranted, they would ask for an increase at the next session also.

Charleston, W. Va.

A livelier demand in all markets was reflected in greater activities among the mines of West Virginia during the week ended May 17, that period even showing improvement over the first ten days of this month. At the present rate of production, May will prove to be the best month of the year, as in several fields the amount of coal mined is rapidly rising to normal, in no field being under 50 per cent. It is predicted that within a month conditions will be even more satisfactory. All classes of consumers now appear to be using more coal not so much as a temporary measuse, but because of regular needs. In certain fields the export demand is strong as a result of increased ocean shipping facilities; at the same time the demand for coal is growing in Lake areas. The effect of the increased demand has been of course to at least hold prices to government fixed rates if not to increase them somewhat.

While business has been much stimulated among the companies operating in the Kanawha field, the output of that particular district was on May 17 still a good many thousand tons below full time capacity. Insofar as it was possible to tell, however, mines were working about half time, or in other words, had produced during the week in question approximately 100,000 or perhaps 110,000 tons; any increases came largely from lake sources, although the general western market seemed to be much more active as indicated by inquiries for Kanawha coal. Taking them by and large, operators of the Kanawha region have been in no rush to ship coal until it could command a price insuring reasonable profit.

As was the case during the weekly period ended May 10, so it was also true of the week following; mines in the New River region were practically all working full time not only in getting out domestic coal but coal for export as well, the export trade having shown a spurt, probably because of the fact that more vessel space was obtainable. However, shipments to tidewater are being governed somewhat by the arrival and sailing of vessels. Insofar as it is possible to gage it, 200,000 tons or more a week were being produced during the week ending May 17. The labor shortage in the New River and Kanawha fields was not quite so pronounced as during the earlier part of May, the fact that mines were working regularly having caused the return of many miners to the field. A large part of New River smokeless is being shipped to Lake ports. Slack coal is moving out rather slowly and therefore is lagging a little in price, but is expected to reach old levels in the near future.

Fairmont, W. Va.

By May 17 production had reached the highest level of the present year in the Fairmont and other northern West Virginia coal fields, activities in the field being much more in evidence than was the case even at the beginning of May; it was estimated that in the three weeks which have elapsed since May 1 the output is fully one-third greater in volume than was the case at the first of the month, the loadings as an example, on the Monongah division alone being over 800 cars a day. Consequently there is less idleness among the various mines in the northern part of the state and it is believed that production is in the neighborhood of 80 per cent. Impetus in part has been given to shipments from northern West Virginia points through a growing demand for coal to be exported, daily shipments averaging as high as 167 loads from one railroad division. By May 17 there was also a considerable tonnage of coal being moved eastward for use on the railroads as well as for general industrial purposes. Western shipments also were materially increased during the week ended May 17, a large tonnage of coal being for Lake delivery. Such coal as is mined for export is being sent to Norway, Sweden and Italy. Prices for run-of-mine coal on spot sales have been running from $2.15 to $2.65 a ton. Some contracts have been made with the Baltimore & Ohio as low as $1.75 a ton, however.

Arrangements are being rapidly completed for the establishment of a rescue station at Fairmont, W. J. Heatherman (chief of West Virginia Department of Mines) and his chief clerk having been in the Fairmont territory where an examination for mine foremen was held during the week ended May 17. The equipment at the Fairmont station will be equal to that found on the average government rescue car and will consist of five helmets, a pulmotor and other equipment needed at a rescue station. Both Mr. Heatherman and Mr. Heiser went to Pittsburgh recently to make arrangements for the purchase of equipment.

Dallas, Tex.

Extensive development of the coal beds in Webb, Uvalde and other Texas counties along the Mexican border is probable, as much attention has been directed to that section of Texas by the recent bulletin issued by the United States Geological Survey. Coal has been known to exist in Webb and Uvalde counties for many years, and has been mined to a considerable extent at Santo Tomas Darwin and Dolores. Most of the railroads in southwestern Texas and in Mexico adjacent to the border have been supplied from these mines. The mining has been confined largely to the outcrop of the seams, however, and little effort has been made to mine the coal any great distance from the outcrop.

The coal occurs in two principal beds, both of which can be traced for a considerable distance along the banks of the Rio Grande, in Webb County, to a point where the coal outcrops swing northward into Uvalde County; here the seams dip somewhat. Two principal beds can be traced, about 90 ft. apart. The beds range in thickness from 2 to 2½ ft. and appear quite persistent.

This coal, geologically, is of considerable interest as it occurs in rocks that elsewhere in Texas bear only lignite, yet the coal here is bituminous. It has the qualities of cannel coal, contains a large amount of volatile matter, and it yields oil by distillation—about 50 gal. to the ton.

Mining has been hampered in this section by the nature of the rock forming the roof; it is of a loose sandy nature and requires timbering. As there is no timber in this section it has proved a drawback to mining operations. The additional cost of shipping in timber has been such that heretofore mining has not been attempted on a large scale where timber had to be used. Several large companies are being organized or considered, and extensive development in this field in the near future seems likely.

Victoria, B. C.

Two important actions, both involving title to the disputed coal rights of the Esquimalt & Nanaimo Railway belt, Vancouver Island, British Columbia, will come before the Privy Council in England this Summer. Hon. J. W. deB. Farris, Attorney General of the province, leaves shortly to appear before that court on behalf of the province. One of these cases is that between the E. & N. Ry. Co. and H. W. Treat, the latter being a resident of Seattle, Wash. A lease to certain foreshore on the east coast of Vancouver Island was given to Mr. Treat by the provincial Government and to this property the company claims ownership, by virtue of the terms of the grant it received in the year 1884. Mr. Treat proposes, if he is successful in this suit, developing the foreshore in question for its coal. From the provincial standpoint, its interest is to maintain the validity of its lease and to establish its authority to give such title. If the effort fails it follows that the company will have possession of all the foreshore on the east coast of the Island from Esquimalt to Nanaimo, a distance practically (as the crow flies) of 80 miles and of indeterminate extent if the undulations of the shore line are followed.

There are two other cases of a similar character; the Esquimalt & Nanaimo Ry. Co., vs Dunlap, and Esquimalt & Nanaimo Ry. Co. vs Wilson & McKenzie (Ganner estate) These Crown grants to coal rights within the railway belt were issued to the defendants by the provincial Gvernment in accordance with the terms of the Settlers Rights Act, 1917, during the interval elapsing between the passage of the act by the provincial Legislature and its disallowance almost a year later by the Dominion. The position taken by the company is that the grants were vetoed automatically with the disallowance. If this is not controverted it is likely to have a serious effect on a large and important island enterprise of recent date, that of the Granby Consolidated Mining and Smelting Company, at Cassidy's Landing. This company has a producing mine provided with modern plant and equipment; furthermore coke ovens, at Anyox, B. C., nearly completed will depend for their supply of coal on the Cassidy colliery.

Meanwhile the agitation among the settlers of the E. & N. Ry. belt continues. A deputation of residents of the Newcastle district recently waited on John Oliver, premier, and Wm. Sloan, minister of mines, to ask what action would be taken to secure their coal rights to them. The provincial legislation of 1917 was disallowed at Ottawa and the Lieut-Governor refused his assent to the re-enacted measure of 1918. The Newcastle delegation was informed that, in view of this and what has since transpired, there seemed little reason to believe that the 1918 legislation would be allowed; the chances of their obtaining title to their coal rights appeared to be slim. There are 180 settlers affected. These people now propose directing their representations to Ottawa and a general meeting of protest is to be held at Nanaimo, B. C., shortly.

PENNSYLVANIA

Anthracite

Lebanon—Lebanon County Commissioners have increased the assessment on the 7228 acres of land held by the Philadelphia & Reading Coal and Iron Co. in Lebanon County from $20 per acre or $144,560 to $142,000,000.

Wilkes-Barre — Frank Carichner, aged 35, of 49 Keith St., and his brother Hugh Carichner were killed at the Mineral Spring colliery of the Lehigh Valley Coal Co., on May 21. The men had prepared a shot which exploded prematurely.

Tamaqua—Fire of an unknown origin has been discovered in the No. 4, mine of the Lehigh Coal and Navigation Co. It is having no serious effect upon production and officials state that indications point to the flames being under control.

Ashland — The Locust dale washery, operated by Thorne, Neale & Co., with main offices in Philadelphia, resumed operations the middle of May, after an idleness of several months. The property lies on the Philadelphia & Reading railroad a few miles west of this place.

Miners Mills—At a conference of representatives of the Wilkes-Barre Connecting Railroad, Miners Mills Borough and Healey Coal Co., Conlon Coal Co., and the Hudson Co., with engineer Krouse of the Public Service Commission on May 21, it was agreed that it would not be safe to proceed with the construction of a viaduct over the railroad tracks, owing to the menace of mine caves.

Sunbury—Northumberland County's anthracite coal land assessments for county taxable purposes will be given a substantial revision upward, according to the present plans of the County Commissioners. It is generally accepted in official circles, although not admitted by the commissioners, that anthracite coal land values will be advanced approximately $50,000,000 for the next three years.

Shamokin—The injunction filed in the courts of Northumberland County by C. J. Golden, president of district No. 9, U. M. W. of A., and several other members of Shamokin, against moving the district office from Shamokin to Shenandoah, has been withdrawn, the objectors paying the costs. At the district convention in Mahanoy City last November the convention approved the action of the district board in the matter.

Scranton—The enlargement and rearrangement of the Carbondale yard of the Delaware & Hudson company has been progressing for several years. This yard is one of the most important facilities in the operation of this coal road, as it is located at the concentration point of all northward bound anthracite passing over the company's lines, and the distribution point of all empties returning to the collieries. Carbondale is at the extreme north end of the Lackawanna coal basin and the D. & H. mines are distributed between this place and Plymouth, a distance of 38 miles. This yard now has an increased capacity of 50 per cent.

Nanticoke—The grievance committee of the Bliss, Truesdale, Auchincloss, and Susquehanna collieries in the Nanticoke district of the anthracite field, have decided that the mine workers of the Loomis colliery of the Delaware, Lackawanna and Western R.R. Coal Department must become members of the U. M. W. of A. by June 1, 1919. This action was taken by the grievance committee on hearing the report of the Loomis committee stating that the general committee should take immediate action on organizing the Loomis miners; otherwise the United Mine Workers are liable to be substituted by some other organization that does not approve of the present method of negotiating agreements and adjusting grievances.

Shenandoah—The Lehigh Valley Coal Co., on May 19, announced important changes of officials at Packer Nos. 4 and 5 collieries. Reuben Ball, for twenty years general foreman at Packer No. 4, has been placed on the pension list, on account of failing health. Richard Kane, inside foreman at No. 3, succeeds Mr. Ball. John Rudd, assistant inside foreman at No. 4, is promoted to the foremanship at No. 3.

The Girard Water Company, owned by the estate of Stephen Girard, has let a contract to the Central Construction Co., of Harrisburg, for the construction of an additional reservoir near Ringtown, not far from this place. The dam, which will cost approximately $200,000, will be completed in about eight months, and when it is put into service will go far toward obviating summer water famines which have hampered collieries and communities in the Mahanoy Valley. The capacity of the reservoir will be 270,000,000 gal.; its superficial area, when full, 42 acres, and its tributary watershed 1280 acres. The maximum depth of water will be 42 ft. Water will be drawn, when needed, from this reservoir into reservoir No. 5, which has a capacity of more than 300,000,000 gal., and which serves as a storage point whence water is pumped to various reservoirs supplying mines and towns. Engineers in charge of the plans were Gannett, Seelye & Fleming, of Harrisburg, and James Archbald, of Pottsville, engineer for the Girard Water Co.

Bituminous

Charleroi—The examining board of the twenty-first bituminous district, which recently held examinations here for mine officials, announced that of the successful applicants who passed examinations, five received certificates as mine foreman, 16 as assistant mine foreman, and 20 as fire boss. The examining board included the following: Inspector C. P. Bryne, Superintendent Joseph Edwards and Michael Dooley, miners.

Altoona—Speaking at the annual meeting of the Central Pennsylvania Coal Producers' Association at this place, May 15, James H. Allport, member of the U. S. Fuel Administration and representative of the United States in investigating mining and fuel conditions in France, urged the members to "develop the export trade in coal to help the French and Italian people get on their feet and to also aid in restoring prosperity in our own country." He told of the great suffering by the Allies and by the people of the allied countries due to the lack of coal brought about by the destruction of foreign mines by the Germans. T. H. Watkins, of New York, representing the exporters' association, also urged a boost in the local operations and the increasing of exports, stating that "only America can supply this big demand from the allied countries." J. D. A. Morrow, secretary of the International Coal Producers' Association, also spoke. The following officers were elected: President, Henry Boulton, of Clearfield; vice president, M. C. Bracken, of Gallitzin; secretary, Charles O'Neill, of Clearfield, and statistician, W. A. Jones, of Hollidaysburg—all of Pennsylvania. The following are the board of directors: T. H. Watkins, of New York, M. J. Bracken, of Gallitzin, B. M. Clark, of Punxsutawney, E. B. Chase, of Philadelphia, Harry Boulton, of Clearfield, T. Larry Eyre, of West Chester, D. C. Morgan, of Kittanning, H. B. Scott, of Philipsburg, J. S. Sommerville, of Robertsdale, J. C. Cosgrove, of Johnstown, George H. Francis, of Greensburg, Thomas F. Kelley, of Coalport, Robert Summerville, of Winburne, J. William Wetter, of Philipsburg, J. R. Caseley, of Du Bois, W. R. Craig, of St. Mary's, T. V. Gould, of Brisbin, and C. H. Jacobs, of Philadelphia.

WEST VIRGINIA

Raleigh—The Raleigh Coal and Coke Co. is making improvements at its Nos. 1 and 6 mines at this place, installing loading booms, steam car dumps and other new equipment which will increase output.

Macdonald—Protest having been made by the machinists of the New River Co. to going to Mt. Hope, where the company expected to relocate its new shops, final decision on the location of this plant has been deferred for the time being.

Wheeling—Shipment of coal to Cincinnati and Louisville over the Ohio River route has been resumed, it having been several months since any coal was shipped via this route. In the first fleet which passed here on May 16 there were 15 barges in two tows, or about 250,000 bu. in all.

Shinnston—A coöperative coal mine is a scheme which gives promise of reaching the development stage at this place. There is a tract of 14 acres of coal within the corporate limits of the town susceptible of development for a municipal supply of fuel. A possible future shortage of gas confronts the town.

Fayetteville,—The Cepec mine which is owned by C. P. Galloway, of Glen Jean, is about ready for operation, construction work on this plant having just been completed. The mine is located near Kilsyth. Two Fayette County men—Dr. C. B. Lee and Thos. Nichol—have leased several hundred acres of coal land from the McKell Coal Co. which will be developed through the opening of new mines.

Charleston—Mines of the Black Betsey Consolidated Coal Co., in Putnam County, are running again, having been closed down since about Jan. 1, because of poor market conditions. These mines are under the management of T. W. Woodward.

The work on the plant of the Ingram Branch Coal Co., near Page, has progressed to such an extent that the company plans to begin the shipment of coal shortly.

Fairmont—It will be necessary in the future to discontinue furnishing cars to mines where such mines have on hand unconsigned loads, provided the situation indicates a reduced car supply. Mines in the northern part of the state have been notified that where any mine carries unconsigned loads such a mine will be subject to having its car supply discontinued whenever the increase in Lake business makes it necessary. The new order indicates a growing car shortage and is made to insure and protect such mines as are working and are billing their coal.

Bluefield—In the Pocahontas district the week ended May 10 was marked by larger gains than have been witnessed at any time in recent months, production going up to 285,000 tons, a gain of 38,000 tons over 247,000 which was the tonnage for the week ended May 3. Equally encouraging was the reduction in the production loss from 171,000 to 114,000 tons—a gain of 57,000 tons; only 88,000 tons were lost from no market as against 141,000 for the previous week—a decrease of 53,000 tons. It will thus be seen that the Pocahontas district is sharing in the increased demand for coal. Certain it is that Pocahontas coal is commanding much higher prices than was the case a few weeks ago.

Huntington—Between May 3 and 10 another gain of 15,000 tons was made in the output of the Logan district. The mines of that district reached a total of 176,000 tons or 58 per cent. of full time capacity; at the same time this tonnage was 40,000 tons under the output for the corresponding week last year when 216,000 tons were mined. There was an increase in production losses of 21,000 tons—or from 148,000 to 127,000 tons. The no market loss was cut from 131,000 to 106,000 tons—a gain of 25,000 tons in that respect. There was a

pronounced increase in the car shortage which was run up from a loss of 1100 to one of 5500 tons.

Huntington—The twentieth semi-annual meeting of the West Virginia Coal Mining Institute will be held at Hotel Frederick at this place on June 3 and 4. The following papers are scheduled: Tuesday morning. "The Future of the Coal Industry," by J. A. Hall. W. D. Roberts will lead the discussion following. Tuesday afternoon. "Is There an Overproduction of Coal in America?" by J. H. Thomas. "The Recovery of Coal," by F. G. Wood (discussion). "Labor Saving Devices," by C. R. Jones. Wednesday morning. "What Coal Operators Have Learned from the War," by E. N. Zern. "The Most Common Violations of the Department of Mines," by W. J. Heatherman. The closing session: two papers on "Coal Preparation," (a) "Inside," by C. H. Tarleton; (b) by J. W. Bischoff.

INDIANA

Linton—Jesse Bedwell, age 35, was fatally injured at the Black Creek mine near this place on May 13, by being struck on the head by a piece of coal. He suffered a fracture of the skull which resulted in his death the following day.

ILLINOIS

Springfield—The June examinations by the state Miner's Examining Board will be held at the following places and at the dates noted: Du Quoin, June 4; Herrin, 5; West Frankfort, 6; Harrisburg, 7; Christopher, 9; Belleville, 10; Litchfield, 11; Springfield, 12; Danville, 13; La Salle, 16; Peoria, 17; Rushville, 19.

Centralia—State mine inspectors, V. P. Rassbottom, J. O'Rourke and Messrs. Wright and Morgan, of Belleville, met in this place to ascertain the cause of the recent explosion in the Glenridge mine of the Marion County Coal Co. near Centralia. Four men lost their lives in the accident, fire followed the explosion and the mine was badly damaged.

Johnston City—The Johnston City Washed Coal Co., has resumed operations at its White Ash mine at this place after a shut down of several weeks. During the suspension of work at this plant, the mine was given a complete overhauling and extensive repairs were made on the shaft and tipple. It is reported that the company has secured large coal contracts for the coming year which indicates that the plant will operate steadily for some time.

KENTUCKY

Boldman—The Furnace Coal Mining Co., located at this place, is making arrangements to increase its output through the installation of electrical equipment throughout its plant, a new power house having been built and power machinery installed.

Coal Run—C. E. Steel, owner of the Coal Run Coal Company at this place and manager of the Funk Coal Co., at Sutton, Ky., has sold his interest in the former company to H. H. Funk. Operations at the Funk Coal Co.'s plant have been suspended owing to repairs which are being made, much construction work is in progress so as to fit the mines for the more extensive mining of coal when operations are resumed.

Farmers—Quite extensive development in three Kentucky counties—Morgan, Breathett and Elliott—is presaged by a large deal in which approximately 200,000 acres of coal and timber lands will change hands, E. B. Carr of Philadelphia and Geo. B. Kaywood of Frankfort having sold the property to St. Louis, Pittsburgh and Chicago capitalists for a sum which will run well into the millions. It is proposed to build a railroad through from Index to Farmers, Ky., following the Licking River, a connection being made at Farmers with the Chesapeake & Ohio.

Pikeville—The Northeast Kentucky Welfare and First Aid Association is the name under which a new organization has been formed in Kentucky, with the following officers: President, J. L. Morgan, Pikeville; vice presidents, C. A. Warden, Hellier, R. C. Thomas, Paintsville, C. E. Anderson, Hellier, K. C. Mitchell, Wolfpit, C. W. Connor, Esco, Charles M. Keyser, Keyser, N. M. White, Prestonburg, J. J. Christie, Lookout and Zach Justice, Pikeville; treasurer, Linton Trivette, Pikeville; secretary, Everett H. Sowards, Pikeville. The new association plans to hold a first-aid contest on July 4 at Pikeville.

Ashland—A special meeting of the operators of northeast Kentucky was held at this place on May 16, being featured by the presence of W. B. Reed, of Washington, D. C., accounting secretary of the National Coal Association. Approximately 50 operators of the Elkhorn and Big Sandy fields were in attendance at the meeting. Mr. Reed talked largely on the proper way to handle war revenue and income tax statements. It was suggested during the meeting that the retention of expert accountants in an advisory capacity would be of much benefit to operators. Traffic counsel will be employed by the association as the result of a report made by the special committee delegated to secure through rates via the Chesapeake & Ohio railroad to tidewater and southeastern points. New members admitted gave the Northeast Kentucky Coal Association a total membership of 74.

Obituary

Walter W. Winton, of Scranton, president of the Winton Coal Co. died of heart failure at his home on May 19. Mr. Winton was a graduate of Harvard University; he also served the Union cause in the Civil War with distinguished bravery. Besides being president of the Winton Coal Co., Mr. Winton was connected with numerous other coal companies and also with banking institutions.

W. Arthur Hitchins, president of the Hitchins Brothers Co., a director of the Hitchins-Brophy Coal Corporation and the Citizens' National Bank, died at the Mercy Hospital in Frostburg, Md., recently. Mr. Hitchins was 50 years old. He succeeded his father, the late Adam E. Hitchins, as head of the Hitchins Brothers Co. and was widely known in the industrial and coal circles of Allegheny County. Among his surviving brothers is Owen Hitchins, of New York and Howard and Emery G. Hitchins, of Frostburg who were associated with him in the Hitchins Brothers Co.

Industrial News

Grove City, Penn.—The Pittsburgh Coal Co. has recently resumed work at its coal stripping operation in Pine Township.

Indiana, Penn.—The Commercial Coal Co. is understood to be planning to increase the capacity of its properties in Black Lick Township. The present output will be practically doubled.

Riceville, Ky.—The Green Rock Coal Co. is planning for the installation of the necessary mining machinery for the development of a large local coal tract. H. D Foster is president and manager.

Jeddo, Penn.—The G. B. Markle Co. is in need of 100 miners and laborers for its Highland No. 5 and Jeddo No. 4 collieries. There is a scarcity of qualified miners in the Lehigh anthracite field at the present time.

Charleston, W. Va.—The Dana Coal Co. has leased a tract of coal, comprising about 1200 acres and located in the Maiden district; it was held by the Maiden Coal Co. The Dana company expects to develop the property.

Edwardsville, Ill.—The Donk Brothers Coal Co. is sinking a shaft at this place and planning the construction of a plant to cost about half a million dollars. When completed and running at full capacity, this operation should employ about 700 workmen.

Moundsville, W. Va.—The Dunkard Valley Coal Co. has recently completed negotiations for the purchase of a coal tract comprising about 7½ acres, located in the vicinity of this place; plans are being arranged for the commencement of operations at an early date.

Harlan, Ky.—William Helton, mine foreman, died as a result of being crushed by falling rock while opening a new mine on the lease of the Canel Bits Coal Co., in North Harlan. His leg and side were badly mashed, resulting in death shortly after reaching the hospital.

Henderson—Plans are being arranged by L. P. Kleiderer, Fourth Street, Louisville, for the inauguration of operations in the local coal mine recently acquired. In connection with the work, it is proposed to install a new shaft, provide the construction of a new coal tipple, with the installation of necessary coal mining equipment, etc.

Monongahela, Penn.—Robert Robinson, of this place, is understood to have recently completed negotiations for the purchase of the holdings of the Vulcan Coal Co., Connellsville, Penn., including about 600 acres of coal with three mines, located at Pomeroy, Ohio. It is also understood that the new owner is planning for continued operation, with increased capacity.

Fairmont, W. Va.—The Consolidation Coal Co. has completed arrangements for the opening of a new mine and the construction of a tipple fronting on the yards of the Pennsylvania Railroad, at Mingo, Ohio. It is also stated that this company recently completed negotiations for the purchase of the holdings of the Royal Coal Co. and the property of the Tarr farm adjoining, comprising about 700 acres.

Birmingham—The annual meeting of the Alabama Coal Operators' Association will be held in this place June 3, 1919. The annual reports of officers will be made, plans for the advancement of the interests of the association will be discussed and officers for the ensuing year will be elected. Consideration will be given to amendments to the constitution and by-laws of the association as proposed at the last annual meeting.

Louisville, Ky.—Traffic manager C. D. Boyd, of the Harlan County Coal Operators' Association, the Hazard Coal Operators' Exchange and the Southern Appalachian Coal Operators' Association, has requested publication of through rates to take the place of combination rates on coal from mines on the Louisville & Nashville, Queen & Crescent and short line connections to destinations on the Baltimore & Ohio R.R.

Toledo, Ohio—Considerable activity has developed at the docks and the Lake trade is gradually increasing. This is shown by the records of loadings at the docks for the week ended May 17. The Hocking Valley docks during the week loaded 12,527 cars or 176,143 tons, making a total of 652,338 tons loaded during the season. The Toledo & Ohio Central docks during the same week loaded 41,810 tons as compared with 24,558 tons the previous week, making a total of 105,342 tons for the season.

Louisville, Ky.—The Western Kentucky Coal Operator's Association met at this place in the Seelbach Hotel, to discuss plans for competing with eastern Kentucky mines, as the result of a new freight rate to Cincinnati, effective shortly. The reduced rate is said to open a new field for western Kentucky coal. Steps were also taken for contracting for the sale of coal to bunker steamships at New Orleans and Mobile. Tests are being made as to the adaptability of western Kentucky coal for this purpose.

Louisville, Ky.—The Illinois Central railroad has requested revision of rates on coal from mines in western Kentucky to Paducah, Mayfield, Fulton and intermediate points, in order to remove preferential rates on nut, slack and pea coal and to place western Kentucky and southern Illinois points on a parity. It is held that rates on steam coal should be 20c. a ton lower than on other grades and that present rates place western Kentucky mines at a disadvantage. The matter will be heard May 28 before the Louisville District Freight Traffic Committee.

Another request, set for hearing May 28, is that of the Southern Railway for publication of an advance of 10c. per ton on coal from mines on the Southern in Tennessee, Kentucky and Virgina to stations in North Carolina on the Elkin & Allegheny Railway.

Bethlehem, Penn.—The Dodson International Coal Corporation recently formed expects to handle the future export coal business of Weston Dodson & Co., Inc., of this place. The following are the officers of the new company: Alan C. Dodson, chairman of the board; Sterling J. Joyner, president; John T. Morrow and W. R. Coyle, vice-presidents; G. R. Radford, treasurer; H. W. Kessler, secretary; J. H. Davison, manager. Mr. Joyner has been identified with the export business and with engineering and construction companies. The Dodson offices in New York will be moved to the fortieth floor of the Woolworth Building and will be in general charge of J. H. Davison, as tidewater and export sales manager. Mr. Davison had been New York manager of Weston Dodson & Co., Inc., for several years prior to his entry into the service in 1917.

MARKET DEPARTMENT

EDITED BY ALEX MOSS

Weekly Review

No Activity in Soft Coal—Prices Being Maintained—Higher Prices Predicted—Output Far Behind Last Year's Figures—Anthracite in Good Demand, with Some Mines Refusing New Business

THE bituminous coal market is colorless. Most of the coal being shipped from the mines is in fulfillment of contract obligations. Operators continue to be optimistic. Coal is being sold at the prices that have been in effect for some time, with the usual reductions heard of here and there on occasional shipments. It is freely predicted that prices will be higher before long, and operators quote above the present level on contracts to the end of the coal year. Production of soft coal for the week ended May 17 is estimated at 8,383,000 net tons. How the lack of demand has curtailed the output of bituminous coal may be gathered from the fact that for the period of Jan. 1 to May 17 the production totaled 160,599,000 net tons as compared with 212,511,000 net tons for the same period of 1918.

So urgent is the request for anthracite that producers are hard put to it to meet the demand. Many of the operators already have sufficient orders on their books to keep their mines working full time well into July. A number of producers refuse to consider any new business for the present. All the domestic sizes of hard coal are eagerly sought, but the smaller steam sizes are moving slowly. During the week ended May 17 there were produced 1,743,000 net tons of anthracite. For the period Jan. 1 to May 17 the output of hard coal totaled 28,859,000 net tons as against 37,144,000 net tons in 1918.

WEEKLY COAL PRODUCTION

The production of bituminous coal in the United States during the week ended May 17 is estimated at 8,383,000 net tons, and is but slightly less than the output of the week preceding, estimated at 8,421,000 net tons. The daily average production during the week ended May 17 is placed at 1,397,000 net tons, and as during the preceding week, exceeded the daily average for the calendar year to date, estimated at 1,361,000 net tons. For the period of Jan. 1 to May 17, the production of bituminous coal in the United States is estimated at 160,599,000 net tons as compared with 212,511,000 net tons for the same period of 1918, thus placing the current year's output to date at approximately 52,000,000 net tons, at 25 per cent. below the record production for last year.

The improvement which began in the anthracite production several weeks ago continued during the week ended May 17, and while such output is slightly lower than the production during the week of May 10, it equals the weekly average during the years preceding the abnormal year of 1918. The production during this week is placed at 1,743,000 net tons, with a daily average of 290,000 net tons as compared with 245,000 net tons for the calendar year to date. As in the case of bituminous coal, anthracite production for the calendar year to date is approximately 25 per cent. below the output for the same period of 1918.

The production of beehive coke in the United States during the week ended May 17 is estimated at 209.975 net tons and considerably below the output for the week ended May 10, estimated at 260,378 net tons. The current week's production is but 33 per cent. of the output recorded during the week ended May 18, 1918, when the production of beehive coke reached the high mark of 634,056 net tons. Production in all states with the exception of West Virginia decreased during the week ended May 17 compared with the ended May 10. The decreases which occurred were slight in all states with the exception of Pennsylvania, where the production amounted to 153,781 net tons as compared with 193,830 net tons during the week ended May 10 and 458,796 net tons during the corresponding week of last year. For the calendar year to date beehive coke production is estimated at 7,964,179 net tons against 11,344,400 net tons during the same period of 1918. The average daily production during the week ended May 17 is estimated at 34,996 net tons as against 67,493 net tons, the daily average for the period Jan. 1 to date and 96,138 net tons, the average daily for the period Jan. 1 to May 18, 1918.

The dumpings of bituminous coal at the lower lake ports during the week ended May 10 are estimated at 718,366 net tons and are approximately the same as the dumpings during the corresponding week of 1918, which were placed at 723,294 net tons. For the 1919 season to date the dumpings are placed at 2,220,848 net tons and are in excess of the dumpings during the same period of last year, which amounted on May 11 to 2,046,284 net tons.

BUSINESS OPINIONS

Marshall Field & Co.—Current wholesale distribution of dry goods is running a little greater than for the corresponding week a year ago. More customers are in the market. Orders from road salesmen for both immediate and future delivery continue in exceptionally large volume, the total being nearly double that of the corresponding week of 1918. Collections are most satisfactory.

Dun's—With practically all centers reporting expansion, bank clearings at the principal cities in the United States this week attained notably high figures and surpassed all previous records for the period. The total at fifteen points amounted to no less than $7,028,308,834, an increase of 26.4 per cent. over the same week last year, and one of 39.3 per cent. in comparison with 1917.

Bradstreet's—Something like a shifting of activity is revealed in the trade and industrial reports this week. Cool, rainy weather and the lateness of some of the spring planted crops, especially corn and cotton, seem to be more stressed at the smaller markets, but increased activity, strength and confidence are revealed at the larger centers, while in instances where weather conditions have been favorable and seasonable temperatures have prevailed the trend has been a very cheerful one.

The Iron Age—Though a measurable volume of business now marks the recent ushering in of government-free trading, nowhere can it be said that the long awaited buying movement is under way. Weighing our various reports the conclusion is forced that pressure is gathering to such an extent that heavy purchasing cannot be long delayed. Concessions in price are unquestionably being made in both iron and steel, but there is no general break from what are regarded as market levels and few of the changes as yet establish a new price. There is no frantic endeavor to get business at keenly competitive prices.

Dry Goods Economist—Probably the most interesting event of the week, so far as the retailer is concerned, is the recommendation by President Wilson that the taxes upon retail sales "can hardly find justification under the easier circumstance of peace, and can now happily be got rid of." In every section activity among the retail dry goods stores is pronounced. The recent gains in the volume of sales have been well maintained and the expectation is general that an era of prosperity is at hand. Labor unrest continues in some textile centers, but the situation has been eased by the settlement of the strikes in Lawrence, Mass., and in Cohoes, N. Y.

American Wool and Cotton Reporter—Strength of the wool market still continues, but there is a decided trend toward conservatism in the trade. On the whole, in the West the buyers are inclined to hold off, prices have advanced so rapidly. Some mills are pretty well supplied with stock now and some have stopped buying for the present. Some are of the opinion that there may be a slump in wool after a while, while others feel that the strength will continue for a long time. "Stronger than ever," is practically the universal report among cotton factors in Boston in regard to the cotton market, and it is predicted that will be the report every week this summer. White cotton, especially staple, is apparently scarce.

Atlantic Seaboard

BOSTON

Market remains inactive. Receipts light. Pennsylvania grades maintain the advantage both all-rail and by water. Balance of railroad orders placed. Hampton Roads situation unchanged. Navy bids due to be opened within a few days. Scarcity of railroad barge tonnage hampers movement from New York and Philadelphia. Anthracite shipments extremely slow. Tidewater receipts far behind the demand. No limit to retail trade.

Bituminous—While there are surface indications of better buying, yet the undertone is extremely quiet. Buyers show as little interest as a month ago and there are many steam-users throughout New England who have not yet arranged for coal they are to use in August. Several large consumers who have usually drawn their supply from the Pocahontas and New River districts are still "experimenting" with grades from central Pennsylvania; there is no comprehensive buying, and aside from spot purchases of limited tonnages the bulk of contract business is still confined to specialties.

The figures show no material increase in receipts here from week to week. It is plain to the trade that the market is absorbing just about what is shipped, and were the tonnage to increase it would mean that New England was at last trying to be forehanded for the future. The strike of engineers in the textile mills of New Bedford, Mass., put 30,000 operatives out of employment and this is only one of many features of the industrial situation that

lead manufacturers to postpone buying on anything like a large scale. Even the railroads have been taking coal in very light volume. Their stocks have been large and it was only recently that arrangements were completed for the 11 months beginning May 1.

This territory shows no change from the turn given the trade early in the year when it became evident that Pennsylvania coals would have the preference. Certainly that advantage has been maintained, for not only by rail but by water from the New York piers are these grades being purchased to the virtual exclusion of the smokeless coals from Hampton Roads. The Boston & Maine R.R. has always taken at least 60 per cent. of its supply by the water route, but this year only about 20 per cent. has been arranged for other than all-rail. And of the 20 per cent. practically all has been bought from Pennsylvania or West Virginia shippers for loading at Philadelphia or New York. Recently the City of Boston bought 45,000 tons of steam coal for harbor institutions and while the contractor is a factor in Pocahontas and New River distribution yet this year the tonnage was placed on Pennsylvania coals, the differential was so much in their favor.

The railroad orders have now been practically all placed and published. Acting largely on directions from Washington the New England purchasing agents have bought in several new channels and the trade is curious to see how some of the experiments will turn out. A number of shippers who have been customary sources of supply and familiar with conditions put in bids on what they considered a fair basis only to find now that they are without any railroad orders at all.

At Hampton Roads there is no material change. Shipments to New England are very light and the sales agencies are obliged to look to Government and export requirements to keep the wheels turning. The coastwise freight market is still easy and steamers normally in this trade are still chartering for South America and occasionally for ports in the Mediterranean. Consignments for Italy are somewhat reduced. The needs there are large but it can hardly be expected that American coal will be shipped in volume until certain kinks are taken out of the political situation between Rome and Paris. The local distributors of Pocahontas and New River are about discouraged over the outlook here for any comprehensive business this season. Rates are now all against Hampton Roads loading, so far as New England is concerned and something radical will have to be done before this situation can be corrected. In a year of light consumption it is possible that this territory will be able to keep running on Pennsylvania coal, but a year of normal activity would doubtless make a different showing.

As the season advances it grows more apparent that there is a real shortage of railroad-owned barges for commercial use. There is a large amount of carrying space in the hands of private owners but naturally under the conditions that prevail the latter are interested only in the most favorable movement, as from New York to Providence on to Boston. One result is the narrowing of other shipments to such railroad-owned barges as may be available and the supply of these has been very much curtailed by the attitude of the Railroad Administration in seeking to reserve a large part of this space for the transportation of railroad fuel. The principal reason seems to be that it is desirable transportation and low-priced; therefore it must be saved for the railroads. It is very difficult on that account to arrange for bituminous deliveries by water when the destination is a point east of Boston.

Current quotations on bituminous at wholesale are about as follows:

	Clearfields	Cambrias and Somersets
F.o.b. mines, net tons	$2.15@2.75	$2.75@3.35
F.o.b. Philadelphia, gross tons	4.27@4.95	4.95@5.50
F.o.b. New York, gross tons	4.62@5.29	5.29@5.85
Alongside Boston (water coal), gross tons	6.10@6.85	6.90@7.35

Georges Creek is quoted at $3.20 per net ton f.o.b. mines.

Pocahontas and New River are being quoted at $4.69@5.14 per gross ton f.o.b. Norfolk and Newport News, Va. Alongside Boston the same grades are being offered at a range of from $6.89@7.24, and on cars Boston and Providence at from $7.60@7.90 per gross ton, the latter being the contract price f.o.b cars for season delivery.

Anthracite—The same situation on railroad-owned barges has a bearing on the volume of domestic sizes that can come forward by water to New England points. Receipts are still much in arrears and retail demand shows no sign of slackening. The way the public is trying to get in its coal for next winter's use is something extraordinary; the persistency with which retail dealers continue to advertise is only more so. To have the householder put his order in early is of itself a great advantage to the retailer provided the latter can get his supply in regular monthly proportions or in quantity sufficient to keep his equipment busy. Neither all-rail or by water are shipments sufficient to meet this unusual situation and there only remains the hope that by August or September wholesale deliveries will have begun to catch up with the demand on the retailer.

NEW YORK

Demand for anthracite increases and operators have orders sufficient to carry them into July. Some shippers refusing new business. Serious shortage forecasted for next winter. Retail dealers wish for heavier shipments. Stove coal in heaviest demand. Bituminous tidewater market dull and prices easy. Plenty of coal at the docks, but spot sales are slow. Contract coals move rapidly.

Anthracite—There is an increase in the demand for the domestic sizes of anthracite which the producers are trying hard to meet. Most shippers have orders sufficient to carry them into July, while some refuse to accept any new business. Handlers of so-called independent coals in some instances have been instructed not to accept any more orders for the present.

Producers and distributors are endeavoring to make shipments equitably, but there is a lot of complaint. Business picked up considerably the lask week of this month, when dealers endeavored to place many new orders in an effort to save the regular monthly advance of 10c. per ton on the price of domestic coals.

Demand is heavy along the line with about an equal call for the various domestic sizes, and the dealers, according to report, appear to be better stocked up than those dependent upon tidewater coal. Locally the size most wanted is stove, but dealers are taking any size they can get. Egg and chestnut are selling rapidly and there is no accumulation. Pea coal, which is usually quiet in this market, is in heavy call and retail dealers are accepting all they can get so long as it enables them to obtain a proportionate share of the larger sizes. Straight orders for pea coal, however, are scarce.

The steam sizes are moving slowly. As is to be expected, these coals are plentiful but are not a drug on the market. Buckwheat is selling well and prices are holding firm. At times slight concessions are heard of, but these are on the poorer grades or on washery coals. Rice is in better supply and at times hard to move. The accumulation of barley is heavy and shippers are experiencing some trouble in keeping it down. Prices are generally held close to circular but, as with rice, slight concessions are made, especially on the so-called independent product.

The retail situation is interesting, first because of the heavy call for deliveries, and second, because of the launching of a new corporation composed in most part of local retail dealers. The new corporation, which will be known as William Farrell & Son, Inc., expects to begin business on June 1 with a tonnage of nearly three million tons. It has taken over the businesses of nine local dealers and one dealer in Jersey City, altogether operating 15 yards. In addition one wholesale firm is in the corporation. Since the formation of the new corporation there have been rumors that other local dealers are contemplating another combine. There are remaining in Manhattan and The Bronx about 40 retail yards.

Because of the high prices submitted in proposals the city departments are seeking permission from the Board of Aldermen to go into the open market for their fuel supplies. Bids were recently opened for furnishing and delivering a couple of hundred thousand tons of coal to twelve city departments. Because the prices submitted were "in excess of the current open market price, and in nearly all cases are higher than the allowances made in the budget to the departments" the Central Purchasing Committee believes a saving would be made by buying in the open market. While the committee complains of the high prices submitted, the dealers say that the specifications of the contracts contain penalties that are too severe.

At the recent opening of bids prices submitted for furnishing and delivering pea coal to the Police Department ranged from $9.98 to $11.25 per ton, depending upon place of delivery; and egg coal from $10.98 to $13.43.

For furnishing stove coal to the Department of Public Charities the prices submitted ranged from $10.97 to $12.89, according to place of delivery; buckwheat coal, $6.99 to $8.27; run-of-mine, $5.75 to $6.55; mixed coal, $6.98 to $7.59, and for furnishing the department with 2060 tons of buckwheat No. 2, the prices submitted ranged from $7.23 to $7.89 per ton.

For supplying the Fire Department with egg coal the prices submitted ranged from $12.45 to $12.99 per ton and for supplying chestnut coal from $12.77 to $13.18 per ton.

Current quotations, white ash, per gross ton, at the mine and f.o.b. tidewater at the lower ports, are as follows:

	Mine	Company Circular
Broken	$6.05	$7.90
Egg	5.95	7.80
Stove	6.20	8.05
Chestnut	6.30	8.15
Pea	4.90	6.65
Buckwheat	3.40	5.15
Rice	2.75	4.50
Barley	2.25	4.00

Bituminous—The local situation is practically colorless. Demand is slow and comparatively little spot coal is moving. There is a good movement on contract coal and indications point to an increase in this tonnage. Buying of coal in the spot market is not as active as it was a few weeks ago. Some of the pools, especially those containing the cheaper grades, are over-run and quotations for some pool coals are considerably lower than the mine basis.

Quotations for the various grades of coal for contract show no apparent change, but for spot delivery at the mine there has been some reductions for certain grades. The same coals in the various tidewater pools are being quoted at still lower prices, based on mine delivery.

The dealers continue to be optimistic as to the future notwithstanding the present situation. They look for a much stronger market within the next few weeks, with stronger prices. The local houses receive many inquiries as to future prospects and quotations for coal on contract. Much interest is being taken in the prices at which the railroads are securing their fuel supply. Operators are not so willing to make contracts running into next April and appear to be more conservative as to tying up their tonnages.

Quotations heard on pool coal follow: Pool No. 9, $2.50, mine price; Pool No. 10, $2.25; Pool No. 11, $2 and Pool No. 71, $2.75.

Quotations on the various grades, mine price, for spot and contract delivery, range as follows:

	Spot	Contract
South Forks	$2.90@$3.25	$2.95@$3.50
Cambria County (good)	2.75@ 2.95	2.95@ 3.25
Clearfield County (good)	2.50@ 2.75	2.80@ 2.95
Reynoldsville	2.50@ 2.75	2.75@ 2.95
Quemahoning	2.65@ 2.85	2.95@ 3.10
Somerset County (best)	2.50@ 2.75	2.95@ 3.10
Somerset County (poor)	2.00@ 2.35	2.50@ 2.75
Western Maryland	2.25@ 2.50	2.50@ 2.75
Fairmont	2.00@ 2.25	2.35@ 2.50
Latrobe	2.10@ 2.25	2.25@ 2.40
Greensburg	2.25@ 2.35	2.35@ 2.60
Westmoreland ¾-in.	2.60@ 2.75	2.60@ 2.75
Westmoreland run-of-mine	2.35@ 2.60	2.35@ 2.65

PHILADELPHIA

Anthracite demand continues, although consumers' orders fall off. Housing problem holds back many spring orders. Shippers swamped with orders and are trying to allot production. Hints of higher prices from June on by some shippers. Stove and nut in greatest demand, with egg scarce and pea showing surprising strength. Steam coal better, if anything. Bituminous shows little change. Railroads still after fuel at their own price. Little change in prices.

Anthracite—This week saw a slowing up in the ordering of coal at retail. The dealers report that comparatively little new business was received by them during the past week. The housing proposition has kept many buyers who formerly placed their orders each spring from ordering their next winter s supply. The dealers, however, have thousands of tons on their books undelivered and their appeals to the shippers of coal continue.

All shippers realize their inability to satisfy their trade at this time, and most of them are working out systems of distribution usually based on obligations of other years. Early in the year it was expected

that when April arrived there would be much shifting of trade. The dealers appeared to be quite willing to make new connections among the shippers, and it was noticeable that the representatives of the different houses accepted considerable new business, possibly because they feared the loss of some of the old. When the situation suddenly changed and the demand for the family sizes became out of all proportion to the production, it was these new connections that brought most of the discontent.

The big companies are simply swamped with orders for egg, stove and nut, and at least one of them is refusing all additional business until some reduction can be made in the accumulation of orders. No doubt the individual operators also hold orders out of all proportion to their ability to ship within a few weeks, but we believe that most of the dealers are worrying about the prices they will be asked to pay the smaller operators next fall and winter. Undoubtedly they are dreading premiums, and not without reason. We have in mind a half dozen houses who have already announced their intention of advancing their prices on egg, stove and nut 15c. per ton each month until September inclusive, instead of 10c. as planned by the companies. There are many high in the trade who predict that prices will go beyond that schedule by the time the snow flies.

While egg is short here there is not the urgent demand, as for stove and nut, but that is only because there is less call for it at any time in this market. Stove is not arriving in sufficient quantities to make any impression on the orders on hand, and the appeals for it continue more urgent than ever. Chestnut, too, is most active, and it will require substantial shipments to care for the business already recorded. By the middle of the present month sufficient orders had been accepted for both stove and chestnut by more than one shipper to care for the prospective production up to the end of June. Pea has been a surprise because the call for it has been beyond the expectation of more than one shipper. A number of sales for heavy tonnages at considerably reduced prices were made a few weeks ago, and purchasers are congratulating themselves and even fearing they might not receive the tonnage they arranged for at the reduced price quoted. Certainly the sellers were premature with these offers and are now refusing to duplicate them. Had they waited a short time the coal would undoubtedly have brought a higher price. It begins to look now as if the great bargains in this size which had been expected would not be available during July and August. We know that all shippers of high-grade pea coal are comfortably filled with orders, at least for the present.

Many of the dealers who had anticipated stocking heavily on nut coal are fast becoming dubious as to their ability to secure any surplus beyond their current needs. Many of them are actually displaying an inclination to take all the pea coal they can get, which is exactly opposite to their former intention. With the probabilities of a coal shortage next winter there can be no doubt that the man with a big pile of pea coal on hand will have an asset that will mean many dollars to him at a time when the people will be glad to take any size of coal.

The steam sizes are showing more signs of strength, and it is predicted by some that soft coal will before long come into its own and that the demand for all good grades will be so great that the anthracite steam sizes will be actively benefited. The larger shippers report consigning only a light tonnage of the small sizes to the storage yards during the past week.

Local dealers are not displaying more than ordinary interest in the proposed law making 2000 lb. the legal weight of a ton in this state instead of 2240 lb., as now in effect. Some of the newspapers have started an agitation that it would actually mean an increase in the price of coal, as there is nothing to compel the dealers to reduce their prices in the event of the law passing. As there is nothing in the new law compelling the shippers to use the net ton, it is presumed that they will continue to base their prices and make shipments on the gross ton. Certainly to use the net ton all around, including freight rates, would greatly facilitate the clerical work in connection with the coal business, and probably for this reason more than anything else most dealers favor it. There is also the additional reason that it would put an end to the criticism as to the high prices of coal locally as compared with other states, most of which use the net ton, but which fact is usually overlooked by the critics.

Bituminous—It is difficult to form an estimate of the bituminous trade. Some shippers report one day that there seems to be an improvement in the outlook, only to be followed the next day with the statement that the conditions are far from promising. Of course, some coal is being sold, principally on contract commitments.

The railroads, while they have closed for a considerable tonnage, are still in the market for increased shipments, but continue in the attitude of wanting to make their own price. Inquiries from industrial plants for contract figures continue to come into the offices and with an occasional fair order being booked.

BALTIMORE

Sufficient bituminous and demand is light. Anthracite in good demand, with dealers unable to fill all orders. Export shipments show increase.

The bituminous market in Baltimore is far from stable, and while there is sufficient coal to handle the situation as far as spot business goes, the demand is light and there is no contracting. Buyers refuse to go in for contracts with the spot market lower than the contract figure and appear content to obtain from time to time what their urgent demands require.

With the better grade of coals quoted at from $2.40 to $2.50 for spot sales, the demand was light. There was plenty of good coal here, and for the medium and cheap grades the prices also were low with a few sales on the former and practically no business worth while on the poor grade. The local market finds little business for poor fuels. For the medium fuels the figure was placed around $2.30 and down to $2.20. The lowest grade of coals brought $2 and under, a few sales being recorded at $1.90.

Dealers in anthracite are still complaining about the lack of hard coal to fill orders. At all of the big local quarters the transportation equipment is only in use part of the time because of lack of coals. Many of the firms are behind on April orders and do not expect at the present rate of receipts to be able to get their files emptied of April business until far into June. It is practically assured that July 1 will see an addition of 25c. to the retail price of hard coal. This is being talked of strongly, and in this way dealers hope to be able to recoup their losses sustained by the May and June increase of 10c. per ton per month.

The export business in bituminous bids fair to show some increase, not exactly on contracts, but in spot business. Vessels loading for the Italian Government, South America, Holland and Sweden are in port. Coal to the amount of 12,197 tons was shipped in cargo during the week.

Lake Markets

PITTSBURGH

Demand stationary. Slack softer. Contracts on firmer basis.

On the whole there has been no improvement in demand for coal in the past week, but the improved condition previously reported is maintained. Operations in the Pittsburgh district are at fully 50 per cent. of capacity, and this is regarded as a good showing in the circumstances, with industrial activity distinctly below normal and some consumers still in possession of considerable reserves, upon which they are drawing.

In the steel industry consumption of coal is somewhat lighter, and it is distinctly below the rate of consumption in April, since in that month the steel mills ran at an average of 65 per cent. of capacity, while at present they are hardly doing better than 55 per cent. There has been a slight improvement in the steel market in the past fortnight, but this can hardly do more than arrest the decline in production that had been occurring through the gradual exhaustion of old orders.

In the matter of coal prices there are somewhat mixed trends. There is developing more softness in slack while there is a stronger tone as to contracts to the end of the coal year. The weakness in slack is a local and ephemeral affair, due to heavier production on account of the large lake shipments now in progress, while the firmness as to contracts is due to more hopeful appraisals of the industrial future generally during the remainder of the year. Coal operators regard it as significant that commodity prices in general show practically no declining tendency and see no reason why they should not take this fact into consideration in connection with their own sales policies.

We quote the market unchanged from last week, but would note that slack is somewhat easier: Best grades gas coal: Slack, $1.80@2; mine-run, $2.35; ¾-in., $2.50@2.60; 1¼-in., $2.60@2.70; Steam: Slack, $1.70@1.80; mine-run, $1.90@2.35, all per net ton at mine, Pittsburgh district.

TORONTO

Domestic coal much in demand. Dealers continue behind in deliveries. Stocks on hand light and little arriving. Soft coal not much in requisition.

Conditions of the coal trade show practically no change, and are similar to those which prevailed during the greater part of last year. Consumers of anthracite are desirous of laying in stocks, fearing a shortage as well as a rise in prices, and dealers are far behind in deliveries. The shipments coming in from the mines are quite inadequate to meet the demand, stocks on hand are very light and local deliveries are mostly being made from the cars. There is no improvement in the call for bituminous, many of the plants in the metal trade being idle or running at reduced capacity, owing to the strike of metal workers.

Quotations for short tons are as follows:

Retail:	
Anthracite, egg, stove, nut and grate	$11.50
Pea	10.00
Bituminous steam	8.25
Slack	7.25
Domestic lump	10.00
Cannel	11.50
Wholesale f.o.b. cars at destination:	
Three-quarter lump	6.00
Slack	4.75 to 5.00

BUFFALO

Bituminous trade still quiet. Only here and there a stir. Consumers still refuse to stock up. Waiting for business to move. Anthracite much below the demand.

Bituminous—Some shippers report an improvement, but the trade is much the same as it has been. Regret is expressed over the breaking down of the slack prices. Allegheny Valley operators allege that it was done by the Pittsburgh shippers. Some improvement is reported in the Canadian trade, but as a rule consumption has run down there more than it has here.

The demand for anthracite might contribute to a car shortage if bituminous were moving at the same rate, especially as Buffalo is now sending 500 cars of grain to tidewater daily. The light demand for bituminous makes it hard to manage the output of steam sizes of anthracite, for only bituminous prices can be obtained for them. It was advocated at the retail coal convention here last week that a general effort should be made to use small anthracite sizes in the domestic trade, so as not to drive them into the bituminous trade, where they are not wanted.

Bituminous prices are rather weak at former figures, $4.65 for thin-vein Allegheny Valley sizes, $4.45 for Pittsburgh and No. 8 lump, $4.20 for same mine-run and $3.80 for all slack, per net ton, f.o.b. Buffalo.

Anthracite—The trade is active. Consumers failing to get their orders filled promptly seem to imagine that the old shortage has returned and are insisting on deliveries. This the shippers cannot comply with if they reserve any for the lake trade. While shippers do not wish to cut the local and all-rail trade short, they know that it will not answer to neglect lake shipments, for when the fall comes the coal cannot be moved at will. There would be vessels enough to load it, but the mines could not turn it out.

Anthracite shipments by lake continue to decline on account of the demand locally and all-rail to the West and Canada. For the week the amount was 88,926 net tons, of which 55,726 tons cleared for Duluth-Superior, 18,600 tons for Chicago, 10,000 tons for Sheboygan, 3200 tons for Fort William and 1400 tons for Portage. Freight rates are 42½c. to Duluth, Fort William and Portage; 47½c. to Sheboygan and 52½c. to 60c. to Chicago.

CLEVELAND

Operators say the market has developed a decided upward trend. Not only is the outlook for immediate increased demand the brightest in months, but prices have stiffened. With the feeling that price revision upward is close at hand, operators are not so anxious to sell as they have been.

Bituminous—So far as demand and prices

are concerned, Cleveland coal interests have become rank optimists. The fog of uncertainty seems to have lifted, disclosing a vast amount of business that disagreement at Washington has kept under cover. Iron and steel interests—the largest single user of steam coal in northern Ohio—are resuming operations, and their order books are growing daily. Already, steam-coal users are showing a more lively interest in the market, although buying has not improved to a marked degree so far.

With the outlook for a broadening field for the surplus slack quite bright, operators are less disposed to offer bargain prices. Prepared sizes, too, have taken on strength. Mine-run continues to rule at slightly more than $2 a ton, with prepared sizes around $2.30 to $2.40. Operators who failed to land railroad fuel contracts now are more than pleased, for a $2.10 or $2.15 contract does not look so attractive in the light of developments the last few days.

Domestic consumers are still taking all of the Pocahontas and anthracite they can get. Dealers are wondering if this coal year will repeat itself; whether they will do a winter business this summer and a summer business next winter. A surprising tonnage is being absorbed by domestic users, especially when holdover stocks of domestc bituminous were supposed to be quite large.

Lake Trade—The trade has lost some of the speed with which it opened the season, due more to the scarcity of cargo space than to decreased demand or supply. The tonnage of bituminous at Lake Erie docks continues in excess of freighter capacity. This is due to the slow opening of the iron-ore season—a condition reviving business is expected to remedy shortly.

Prices of coal per net ton delivered in Cleveland are:

Anthracite:	
Egg	$10.85@10.95
Chestnut	11.15@11.25
Grate	10.95
Stove	11.05@11.15
Pocahontas:	
Forked	8.85
Lump	8.00
Mine-run	7.20
Domestic Bituminous:	
West Virginia splint	7.30@ 7.40
No. 8 Pittsburgh	6.10@ 6.35
Massillon lump	7.30@ 7.40
Steam coal:	
No. 6 slack	4.20@ 4.40
No. 8 slack	4.60@ 4.85
Youghiogheny	4.90@ 5.10
No. 8, ¾-in.	5.35@ 5.50
No. 6 mine-run	4.40@ 4.50
No. 8 mine-run	4.70@ 4.85

DETROIT

Sales of bituminous continue to fall short of normal, arousing apprehension of uncertain supply later.

Bituminous—Persistency of the users of bituminous coal in holding off on placing orders is reflected in the meager volume of business coming to wholesalers and jobbers in the Detroit market. The unwillingness of buyers to make provision now for future requirements creates a very unsatisfactory situation in the bituminous trade and occasions considerable anxiety to jobbers who have studied the general condition of the market.

The assertion is made that a reaction is almost certain to come, probably late in the summer, and that there will then be seen a grand scramble among consumers of steam coal to cover their requirements for the coming winter. It will be impossible, the jobbers say, for the producers to satisfy all consumers in the limited time that will be available, and the result, it is feared, will be that many of the buyers will not get all the coal they need. Jobbers emphasize the contention that should such a contingency arise, the buyers will have only themselves to blame, but probably will try to attach the responsibility to the coal men.

The expectation of lower prices, the jobbers insist, is certain to meet with disappointment. Instead there is said to be substantial basis for the belief prices will be higher than now, with transportation conditions less favorable for assuring prompt delivery of shipments.

Prices on West Virginia splint or gas lump at the mine, net ton basis, are quoted as $2.75; for three-quarter lump, $2.50; for run-of-mine, $2.10 to $2.25; for slack, $1.85. On the same basis, Hocking domestic lump is quoted $2.50; mine-run, $2, and slack, $1.50. Other leading varieties of Ohio coal are said to hold about the same level as Hocking. Smokeless is not very plentiful. Lump and egg is practically out of the market, with prices at $3.50 to $4, while mine-run is obtainable at $2.75.

Anthracite—Retail dealers are making a diligent effort to accomplish an early distribution of anthracite among household consumers. The latter, however, are less receptive than would be expected following the experience of the last two seasons.

Lake Trade—Coal for the lake trade is moving rather freely. Shipments for the week ending May 17 are reported as 860,880 tons, the highest for one week so far this season.

COLUMBUS

A better feeling is shown in every branch of the coal trade. Demand from manufacturing plants is increasing and there is also an increasing lake movement. Some stir in domestic trade is reported. The screenings market is still soft.

The coal trade in Ohio is getting better from day to day. Buying is on a more liberal basis and purchasers are in the market for quotations. Since the award of the railroad fuel contracts the situation has cleared to a large degree, and many coalmen predict an upturn in the market. With the exception of screenings there is a better demand for all grades of coal, and in some instances premiums are being offered for shipment.

The steam trade is now attracting the attention of coalmen. There is a better demand for mine-run and other sizes except screenings. Reserve stocks in the hands of consumers are gradually being reduced to a point where they will be compelled to come into the market soon. This applies especially to general manufacturing lines. Rubber plants still have a considerable surplus and the same is true of iron and steel concerns. But the steam situation is better than formerly, and there are a larger number of inquiries received from concerns which are about to start up. Railroads are taking a larger tonnage than formerly.

The lake trade is progressing satisfactorily as far as concerns having their own dock connections is concerned. A fair tonnage is moving from Ohio and West Virginia mines to the Northwest. Vessel rates have now been fixed at 42½c. from Ohio and Pennsylvania ports to the head of the lakes. Lake agreements for tonnage have been made with the prices left blank. Shipments have been made on these agreements. Some little mine-run is being shipped to the lakes but the large majority is prepared sizes.

The domestic trade is showing up more actively with some retailers in the market. This applies especially to the fancy grades such as Pocahontas and West Virginia splints. Little Hocking coal is being stocked. Prices for the fancy grades are exceedingly high and recent advances have all been maintained.

CINCINNATI

Everything is quiet. Reduction in the price of anthracite is expected to stimulate buying.

The coal situation here is still quiet. Large coal dealers report that business is only fair, and that the demands for the different grades continue to remain far below normal. There was, however, a decrease in the price of some kinds of coal that might stimulate trade somewhat; anthracite, formerly priced for this locality at $12.50 for chestnut and egg per ton, has taken a drop to $11.75 and $12. Domestic egg coke has also taken a drop from $11.50 per ton to $9.35 and $9.45. Smokeless grades, for which there has been a heavy demand here lately, has increased in price. This coal, which has been quoted at $7 and $7.25, has been increased to $7 and $7.50.

The Ohio Valley Coal Operators Association has petitioned the Louisville District Freight Traffic Committee for through rates on coal from mines in western Kentucky to southwestern territory, and a hearing has been set for June 5.

LOUISVILLE

General business showing improvement, with slightly better steam demand; stocking orders for domestic increasing. Prices on domestic coal firm, but spot steam-coal prices are weak and cover a wide range.

Bad weather during the greater part of the past month has been an incentive to early stocking, although it has not produced much actual business, as the domestic consumer has been able to keep warm with gas. However, stocking orders have been coming in somewhat better, and while retailers generally state that business is dull, they are operating a much larger percentage of their delivery equipment and are buying more freely from the mines.

Jobbers report a fair movement of coal into some Southern districts, and also to the lake region, with steam draggy, but mine-run picking up and domestic or prepared sizes in good demand at strong prices. Notices have been received by jobbers and retailers of further price advances about June 1, on numerous grades of block coal. North of the Ohio there is a steadily increasing demand from dealers, principally in Ohio, Indiana, Illinois, Michigan and Minnesota, while Kentucky consumption is holding up nicely.

The producers of eastern Kentucky are feeling much better over improved conditions, reporting a 70 per cent. or better production, with full supplies of labor and cars. Block coal is in strong demand, with markets steadily advancing; mine-run is better. Getting rid of spot screenings has not been easy with steam plants. Contract prices as a whole are firm, however, and several good contracts have been closed. The Louisville & Nashville R.R. has closed most of its contracts, and the Big Four lines recently closed contracts with West Virginia and eastern Kentucky mining concerns at prices ranging from $1.88 to $2.25 for the most part.

The following prices are being quoted by Kentucky districts, less 15c. per ton brokerage, and plus 15 to 30c. a ton on contracts.

Elkhorn and Harlan—Block, $3 to $3.10; mine-run, $2.40; nut and slack, $1.60. Hazard—Block, $3; mine-run, $2.40; nut and slack, $1.60. Jellico—Block, $3.25 at $3.40; mine-run, $2.40 at $2.50; nut and slack, $1.90. Straight Creek—Block, $3 at $3.15; mine-run, $2.40; nut and slack, $1.75. Western Kentucky—Lump, $2.20 at $2.60; mine-run, $2 at $2.35; nut and slack, $1.60 at $1.75; thin screenings, $1.40. Blue Gem—Block, $3.50.

There is a considerable range in some of the prices, but the foregoing figures are as close as can be had. Some Hazard block is reported as low as $2.50 and up to $3.25, or an average of $2.76, with mine-run selling at $2.40@2.90, and nut and slack, $1.50@2.75. Wide ranges are due largely to tipple and wagon operations, and good grades as compared with grades from poorer mines in the same field.

BIRMINGHAM

Slightly improved condition in coal trade, with some contracts closed for steam fuel. Domestic situation tight, with tendency for advance in price of all grades. Production shows falling off of some 25,000 tons, as compared with previous week.

Some contracting was done for steam fuel during the past week by cotton oil mills and ice factories to cover requirements for the coming summer and fall, and while inquiries are somewhat better, other classes of consumers are still holding off from actual buying, business being confined to scattering small orders. Lack of vessels for caring for foreign trade is undoubtedly hindering the consummation of some deals for coal from this district, as inquiries are being received almost daily from some foreign territory; and as soon as bottoms are provided, rates adjusted and some other details arranged some good orders will more than likely be booked by local coal men.

The demand for domestic coal is sharp and the shortage is already pronounced in the better grades, while production of the medium and lower grades is still held down by the lack of orders for steam grades. Cahaba operators have advanced prices on lump and nut from $3.85 to $4.25 and $4.75—those who have not entirely sold up their production through the remainder of the year. Corona lump and nut has advanced from $3.40 to $3.65 per net ton mines during the past week, and on account of the scarcity of all domestic fuel prices are expected to steadily climb as the demand increases with the approach of fall and winter.

Coke

CONNELLSVILLE

Spot furnace and foundry coke stiffer. Uncertainty whether furnaces will close second half contracts. Production very light.

On the one hand spot furnace coke cannot be picked up at as low prices as formerly, while on the other hand there are rumors of large numbers of loaded cars held on track because the holders will not accept prices consumers would offer. As the time for making second half contracts has practically arrived, the operators may be engaged in an effort to produce a strong spot market for the favorable influence this

would exert upon contract prices; but in this they may be reckoning without their hosts, since the furnaces that buy coke have scarcely any pig iron sold ahead and may prove quite indisposed to take hold for a six month's period even at price concessions. The attitude of the merchant furnaces is that they do not want to run unless they can make a profit. Pig iron prices are very high, and so are pig iron production costs, and the furnaces would rather see a margin of profit made for them by a decline in production costs than by an increase in selling prices. While the operators expect to close second half contracts in the next few weeks, it is not certain that they will be able to do so.

The whole coke situation, at best, has become a narrow affair. While the merchant ovens in the Connellsville and Lower Connellsville region averaged more than 140,000 tons a week production from the middle of March last year until the end of October, their production lately has been averaging less than 45,000 tons a week, or about 30 per cent. as much. The furnace ovens show a still greater decrease approximately from a 190,000 ton average to a 40,000 ton average, whereby they are making only about 20 per cent. as much coke as formerly. This great decline is due to the fact that the decreased consumption falls almost entirely upon the Connellsville region, the byproduct ovens at the various furnace plants remaining in almost full operation.

Spot furnace coke is usually quoted at $4, but $3.75 might possibly be done in some cases. Spot foundry coke has stiffened, common brands formerly obtainable at $4.25 now bringing $4.50, while recognized standard brands readily bring their former prices, up to $5. Thus the spot market is quotable at $3.75@4 for furnace and at $4.50@5 for foundry, per net ton at ovens.

The "Courier" reports production in the Connellsville and Lower Connellsville region in the week ended May 17 at 83,284 tons, a decrease of 17,696 tons.

Buffalo—An effort is being made to establish a trade here in high-grade coke for domestic use in various sizes at $7.10 per net ton f.o.b. here. The scarcity of anthracite favors it somewhat, though the low price of bituminous makes it impossible to sell coke breeze. The quoted price of 72-hour Connellsville foundry is $7.25 to $7.50; for 48-hour furnace, $6.60; and for off grades, $6. There is no improvement in the demand for iron ore, the amount coming down by lake still being small.

Middle Western

GENERAL REVIEW

Business dull, in spite of small improvements. Belief is growing that there will be a shortage of coal this fall and winter.

Business in Illinois and Indiana continues very dull, in spite of some small improvements. Coal is moving but slowly on current orders, both steam and domestic. Some business, calling for future shipments, has been reported, but not very much. The tendency on the part of the coal dealer to contract is growing, and an encouraging number of closed contracts have already been reported, with more to follow. The buying public, as yet, are not aware of their danger, and they probably will continue in blissful ignorance until, through either car shortage or labor shortage, they will be unable to get the amount of coal they require. It is worthy of note to remark that practically all bituminous operators firmly believe that this country is heading directly toward another and perhaps more serious coal shortage than before experienced. These operators formed their opinions on the fact that the mines will not have the labor to get out the coal, once the demand comes; furthermore, they believe the railroads will be unable to furnish an adequate number of cars to meet the demand which must come.

Reports continue to come in relative to railroad coal. A number of the larger operators and jobbers have taken railroad business below the old Government prices. This is rather disappointing, especially as we now understand that the railroads were unable to buy their steel rails any cheaper, even after they sent out bids all over the country. In short—the steel industry stuck together—an example the coal operators could well afford to follow.

CHICAGO

Steam and domestic demand brisk. Eastern coals in good request. Higher prices predicted.

Chicago has been having cooler weather, all spring, and this has helped the local situation to a considerable degree. The steam plant, as a result, has reduced its storage pile more than expected, and the householder has had to keep his furnace going steadily. In short, the local situation has been fairly brisk both among steam and domestic lines.

There has been an increase in business on Franklin County domestic coals, as operators in that field are advising the trade that the price on domestic sizes for June shipments will be $2.85 per ton f.o.b. mines, an increase of 10c. per ton over the May price.

Franklin County operators are not quoting prices calling for shipments after June 30, nor do they commit themselves as to what the July price on their coal will be.

The demand for eastern coal continues strong, and those that have good Pocahontas or New River coal from West Virginia and Hazard coal from Kentucky are having no difficulty in getting extra high prices on domestic sizes. Last reports show Pocahontas and New River lump selling at from $4.25 to $4.50 and Kentucky coal at $3.50. Indications point to higher prices in the near future.

Prices are as follows:

	F.o.b. Mines, Per Ton	Rate to Chicago
Southern Illinois		
Franklin, Saline and Williamson Counties, etc.		
Prepared sizes	$2.55 to $2.75	$1.55
Mine-run	2.35 to 2.50	1.55
Screenings	1.85 to 2.20	1.55
Central Illinois		
Springfield District		
Prepared sizes	2.55 to 2.75	1.32
Mine-run	2.00 to 2.35	1.32
Screenings	1.90 to 2.20	1.32
Northern Illinois		
Prepared sizes	3.25	1.24
Mine-run	3.00	1.24
Screenings	2.75	1.24
INDIANA		
Clifton Fourth Vein District		
Prepared sizes	$2.65 to $2.75	$1.27
Mine-run	2.35 to 2.45	1.27
Screenings	2.05 to 2.25	1.27
Knox County Field		
Prepared sizes	2.65 to 2.75	1.37
Mine-run	2.20 to 2.45	1.37
Screenings	1.90 to 2.25	1.37
New River and Pocahontas		
Prepared sizes	4.25 to 4.50	2.60
Mine-run	3.00 to 3.25	2.60
West Virginia Splint		
Prepared sizes	2.50	2.60
Mine-run	2.00	2.60
Pennsylvania Smokeless		
Prepared sizes	3.75 to 4.00	2.60
Mine-run	3.00 to 3.25	2.60
HAZARD AND HARLAN KENTUCKY FIELDS		
Hazard		
Prepared sizes	$3.00 to $3.50	$2.45
Mine-run	2.55 to 2.75	2.45
Harlan		
Prepared sizes	2.85 to 3.50	2.45
Mine-run	2.50 to 2.75	2.45
Cannel	2.75 to 3.00	2.45
Smithing coal	2.50 to 3.00	2.60

MILWAUKEE

Coal market quiet, with fair business. Pocahontas mine-run for steam purposes reduced 25c. per ton.

The Milwaukee coal market continues at an even tenor, with a fair amount of business. The first and only change thus far in the May schedule of prices was formulated during the week, Pocahontas mine-run for steam purposes being cut 25c. per ton, or from $7 to $6.75. There has been some newspaper agitation over the fact that the C. Reiss Coal Co., at Sheboygan, Wis., 25 miles north of Milwaukee, on Lake Michigan, advertises anthracite coal at lower figures than are current here, egg, stove and nut being 90c. less, pea 40c. and buckwheat $1.40. The lake freight to Sheboygan is the same as to Milwaukee. It is reported that coal is being sold at other ports to the north of Sheboygan at less than Milwaukee prices. Thus far there has been no explanation of the matter by those in control of the coal business here. The movement of coal by lake has slowed up a little. Receipts thus far since the opening of navigation aggregate 158,538 tons of hard coal and 466,711 tons of soft.

ST. LOUIS

St. Louis market has no demand for any kind of fuel and such little as is being forced on buyers is at a price below cost. The entire trade is utterly demoralized, both wholesale and retail, with the exception of the Carterville and Mt. Olive fields. Car supply good but movement a little slow.

The local situation continues unusually quiet with absolutely no demand at all unless it be for the normal requirements of screenings for the few steam plants that are in operation. The screening market in normal times would be stronger, but at the present time there is an unusual quietness in manufacturing, many of the large plants being on half time and some practically suspended.

The demand for steam coal in the country is insignificant. In the south the wet weather has prevented the lumber business from going forward as it should, and the rainy weather in the past few weeks has also retarded the wheat situation which usually calls for a light movement of coal for threshing for some districts as early as the middle of May.

The domestic situation locally could not be in any worse condition than it is at the present time. While the wholesale prices of high grade coal continue to increase, the local retailers are cutting prices and making it cheaper until they are delivering coal at less than it actually costs them. This pertains mostly to the wagon-load steam business.

The retail prices for the domestic user still continue to be pretty well maintained. One of the causes responsible for this is the action of the Standard operators who insist upon cutting prices to get the little tonnage available. Some of these mines are working one and two days a week on commercial coal. A few mines that are working on railroad coal get as many as four days a week. In other sections the mines are idle altogether and there is a growing dissatisfaction among the miners relative to the unequal manner in which the tonnage for the entire field is being distributed.

In the Mt. Olive field conditions still continue satisfactory on the two or three days a week that the mines are getting and prices are being pretty well maintained. In the Carterville field of Williamson and Franklin Counties there has been a noticeable improvement in the movement of the domestic grades of coal. As a matter of fact, screenings are also in good demand and are bringing the top prices. The railroad tonnage in this field is light at the present time, but in a general way the entire situation is satisfactory. Cars are plentiful, but the movement of cars on all lines from all fields in Illinois is just a trifle slow.

The condition in the Du Quoin field is not as satisfactory as that of the Carterville field, but there are some signs of improvement,

The anthracite situation in St. Louis is slow. The shipments are three to four weeks behind, but the local demand is not what it was expected to be. Orders were taken for about fifty cars of West Virginia smokeless coal to be shipped in during the latter part of May and the early part of June. Perhaps a dozen or fifteen cars of Arkansas smokeless moved in, but there is little demand for the Arkansas coal, while the demand for West Virginia seems to be increasing.

Coke is taking slowly with the public, but at the present time the general storage of coal is light. The coming month will see a fairly good start made on the storage coal tonnage.

The prevailing prices, which will be increased 10c. a ton on the first of June by the Franklin County operators, is:

Williamson and Franklin County Association:	Mt. Olive and Staunton	Standard
Lump, egg and nut	$2.75	.....
Washed Nos. 1 and 2 nut	2.85	.....
Independent:		
Lump, egg and nut	2.55	$2.55
6-in lump	....	....
Washed Nos. 1 and 2 nut	2.85	.....
Mine-run	2.35	2.20
Screenings	2.20	2.05
3-in. lump	....	2.30
2-in. lump	....	.....
2x6 egg	....	.....

Standard
.....
.....
....
$2.00 up
.....
1.60@1.70
1.35@1.50
.....
1.75
1.75 up

Williamson-Franklin County rate to St. Louis is $1.07½; other rates $0.92½.

I. C. C. Decisions

No. 9517—Ohio Valley Coal Operators' Association vs. Illinois Central Railroad Co., Director General, et al. Submitted Mar. 6, 1919. Decided May 1, 1919.

Upon complaint attacking the rates on bituminous coal, in carloads, from mines in western Kentucky on the Illinois Central, Louisville & Nashville, and Kentucky Midland railroads, to points in Mississippi Valley and southwestern territories, Illinois, and various other northern and western states, Held:

1. The rates assailed are not shown to be unreasonable per se, nor are they shown to be unduly prejudicial except to the extent stated in the following paragraphs.

2. The rates from mines on the Illinois Central to points in Texas by way of Mississippi River crossings south of East St. Louis are unduly prejudicial to the extent that they exceed the rates contemporaneously maintained from mines on the Illinois Central in southern Illinois to the same points through the same river crossings.

3. The rates from mines on the Illinois Central and the Louisville & Nashville to East St. Louis and St. Louis, proper, are unduly prejudicial to the extent that they exceed by more than 57.5c. per ton the rates contemporaneously maintained from mines in the Illinois Central's inner group and the Louisville & Nashville's Belleville group, respectively, in southern Illinois to the same destinations.

4. The rates from mines on the Illinois Central and Louisville & Nashville to East St. Louis, as applied on traffic for beyond, are unduly prejudicial to the extent that they are not lower than the rates contemporaneously maintained from the same mines to East St. Louis, proper, by at least 12.5c. per ton.

5. The rates from mines on the Illinois Central to Chicago, to points in the northwest as defined in this report, and to points in Illinois north of and including Mattoon and Decatur, are unduly prejudicial to the extent that they exceed the rates contemporaneously maintained from mines on the Illinois Central in the southern Illinois group by more than 25c. per ton.

6. The rates from mines on the Louisville & Nashville to Chicago are unduly prejudicial to the extent that they exceed the rates contemporaneously maintained from mines on that road in the Eldorado group in southern Illinois to Chicago by more than 25c. per ton.

7. The rates from mines on the Kentucky Midland Railroad are unduly prejudicial to the extent that they exceed the rates contemporaneously maintained from mines on the Illinois Central in western Kentucky to the same destinations.

General Statistics

Shipments and Value of Anthracite in 1917 and 1918

The statistics of shipments and value of anthracite in 1918 as compiled by the Geological Survey from the final reports of the operators, are given in the following tables. Although shipments of anthracite decreased 1 per cent., the value at the mines increased 18 per cent. The average value at the mines of chestnut, for instance, increased from $4.45 per gross ton in 1917 to $5.12 in 1918; of pea size from $3.12 to $3.77.

ANTHRACITE SHIPPED IN 1917 AND 1918, BY REGIONS AND SIZES, IN GROSS TONS

Size	Lehigh Region				Schuylkill Region					
	1917		1918		1917			1918		
	Mines	Washeries	Mines	Washeries	Mines	Washeries	Dredges	Mines	Washeries	Dredges
Lump	51,176	.....	7,211	.....	104,521	.....	.....	64,346	.....	.....
Broken	485,577	1,061	414,153	4,314	1,032,732	.....	.....	1,156,097	.....	.....
Egg	1,386,859	13,743	1,345,485	10,764	2,517,914	3,478	.....	2,464 991	8,272	.....
Stove	1,902,895	14,167	1,782,206	20,710	3,577,834	12,888	200	3,228,731	13,528	.....
Chestnut	2,296,760	176,741	2,226,055	214,623	4,335,248	120,871	.....	4,109,420	134,041	171
Pea	1,066,363	87,827	1,027,559	92,452	2,104,780	246,012	523	1,937,187	375,930	1,494
Buckwheat No. 1	1,531,493	123,049	1,532,535	157,006	3,553,580	461,008	4,997	3,163,733	646,776	2,908
Buckwheat No. 2	806,394	168,497	582,759	177,273	1,239,449	258,882	5,434	952,041	483,742	26,802
Buckwheat No. 3	538,490	314,998	656,326	369,212	1,274,067	272,642	13,325	1,855,371	660,719	34,863
Boiler	294,521	51,487	339,727	11,111	366,853	227,073	18,483	287,750	45,198	52,419
Other (a)	179,413	1,452	482,877	97,684	242,023	31,888	1,350	197,967	101,832	3,278
Total	10,503,941	953,022	10,396,893	1,155,149	20,349,001	1,634,742	44,312	19,417,634	2,470,038	121,935

Size	Wyoming Region						Sullivan County				Per Cent of Total,		Per Cent of Change in Sizes,
	1917			1918			1917		1918				
	Mines	Washeries	Dredges	Mines	Washeries	Dredges	Mines	Total	Mines	Total	1917	1918	1918
Lump	34,900	.....	.....	61,972	.....	.....	.....	154,597	.....	133,529	0.2	0.2	—13.6
Broken	2,990,125	.....	.....	3,141,248	2,245	.....	22,394	4,531,889	32,263	4,750,320	5.9	6.2	+ 4.8
Egg	6,456,305	11,295	.....	6,385,431	28,108	.....	41,861	10,431,455	36,912	10,279,963	13.5	13.4	— 1.5
Stove	8,715,512	41,829	.....	8,256,966	65,819	701	59,180	14,324,505	54,289	13,422,950	18.5	17.5	— 6.3
Chestnut	10,594,746	159,303	.....	10,480,078	167,424	930	69,780	17,753,449	75,399	17,408,141	22.8	22.7	— 1.9
Pea	3,078,971	190,471	300	2,780,922	202,614	490	48,756	6,824,003	52,733	6,471,381	8.8	8.4	— 5.2
Buckwheat No. 1	5,170,433	814,616	.....	4,475,507	821,951	380	.....	11,659,176	.....	10,800,796	15.0	14.1	— 7.4
Buckwheat No. 2	2,389,077	1,251,822	.....	2,031,978	1,141,427	.....	.....	6,119,555	.....	5,396,022	7.9	7.0	—11.8
Buckwheat No. 3	451,897	208,265	.....	1,216,394	231,979	.....	.....	3,073,684	.....	5,024,864	4.0	6.5	+63.5
Boiler	645,565	82,513	2,580	760,140	178,844	.....	.....	1,689,075	.....	1,675,189	2.2	2.2	— 0.8
Other (a)	269,605	17,639	.....	271,601	40,889	.....	185,285	928,655	161,874	1,358,002	1.2	1.8	+46.2
Total	40,797,136	2,777,753	2,880	39,862,237	2,881,300	2,501	427,256	77,490,043	413,470	76,721,157	100.0	100.0	— 1.0

VALUE OF ANTHRACITE SHIPPED IN 1917 AND 1918, BY REGIONS AND SIZES

Size	Lehigh Region		Schuylkill Region		Wyoming Region		Sullivan County		Total		Average Value	
	1917	1918	1917	1918	1917	1918	1917	1918	1917	1918	1917	1918
Lump	$71,249	$35,906	$454,315	$341,755	$112,072	$252,884	.....	.....	$637,636	$630,545	$4.12	$4.72
Broken	1,963,843	2,038,976	4,349,743	5,977,848	11,374,169	14,703,895	$89,845	$175,351	17,777,600	22,896,070	3.92	4.82
Egg	6,128,183	6,712,050	10,912,844	12,393,265	26,839,488	30,711,534	165,431	183,719	44,045,946	50,000,568	4.22	4.86
Stove	8,623,742	9,097,340	16,311,779	17,012,522	37,482,081	41,055,551	232,569	283,368	62,650,201	67,448,781	4.37	5.02
Chestnut	11,300,903	12,589,113	20,666,227	22,713,532	46,770,455	53,483,908	297,268	415,424	79,034,853	89,201,977	4.45	5.12
Pea	3,869,783	4,332,738	7,363,535	8,875,797	9,890,762	10,964,304	156,008	228,073	21,280,088	24,400,912	3.12	3.77
Buckwheat No. 1	4,516,291	5,925,863	10,349,704	13,022,356	12,324,752	14,820,098	.....	.....	27,190,747	33,768,317	2.33	3.13
Buckwheat No. 2	1,413,599	2,173,770	2,845,796	4,017,238	4,648,633	6,829,942	.....	.....	8,908,028	13,020,950	1.46	2.41
Buckwheat No. 3	842,059	1,919,543	2,290,717	5,345,837	996,592	3,089,354	.....	.....	4,129,368	10,354,734	1.34	2.06
Boiler	624,352	758,721	860,594	783,449	940,675	2,113,812	.....	.....	2,425,621	3,655,982	1.44	2.18
Other	82,133	683,721	290,549	399,792	419,972	704,127	321,059	355,705	1,113,713	2,143,345	1.20	1.58
Total shipments	$39,436,137	$46,267,741	$76,695,803	$90,883,391	$151,799,651	$178,729,409	$1,262,210	$1,641,640	$269,193,801	$317,522,181	$3.47	$4.14

(a) Includes quantity reported as culm, buckwheat No. 4, buckwheat No. 5, screenings and mine-run.

Coal and Coke Securities

New York Stock Exchange Closing Quotations May 26, 1919

STOCKS	Ticker Abvn.	Bid	Asked
American Coal Co. of Allegheny	(ACL)	45	...
Burns Brothers, Com	(BB)	151	158
Burns Brothers, Pfd	(BB)	99¾	115
Central Coal & Coke, Com	(CK)	55	...
Central Coal & Coke, Pfd	(CK)	63	...
Colorado Fuel & Iron, Com	(CF)	47½	47¾
Colorado Fuel & Iron, Pfd	(CF)	105	120
Consolidation Coal of Maryland	(CGM)	75	...
Elk Horn Coal, Com	(EH)	30	31
Elk Horn Coal, Pfd	(EH)	...	47
Island Creek Coal, Com	(ICR)	39	...
Island Creek Coal, Pfd	(ICR)	75	...
Jefferson & Clearfield Coal & Iron, Pfd	(JF)	60	...
New Central Coal of West Va	(NCC)	5	...
Pittsburgh Coal, Com	(PC)	61¾	61¾
Pittsburgh Coal, Pfd	(PC)	92	112
Pond Creek Coal	(PD)	17½	18
Virginia Iron, Coal & Coke	(VK)	68	69

BONDS	Bid	Asked
Cahaba Coal, 1st Gtd. 6s, 1922	90	...
Clearfield Bituminous Coal, 1st 4s, Ser. A, 1940	71	...
Colorado Fuel & Iron, Gen. 5s, 1943	91	93½
Colorado Indus. 1st Mtg. & Col. Tr. 5s, 1934	76	76½
Consolidation Coal of Maryland, 1st Ref. 5s, 1950	88¾	91
Jefferson & Clearfield Coal & Iron, Sec. Mort. 5s, 1926	96	...
Lehigh Valley Coal, 1st Gtd. 5s, 1933	99½	100½
Lehigh Valley Coal, Gtd. Int. Red. to 4%, 1933	79¾	...
Lehigh Val. Coal & Nav. Con. S. F., 4½s, Ser. A, 1954	90	...
Pleasant Valley Coal, 1st S. F. 5s, 1928	80½	...
Pocahontas Coal & Coke, Joint 4s, 1941	84½	86
Pocahontas Con. Collieries, 1st S. F. 5s, 1957	88	88½
Roch. & Pitts. Coal & Ir., Helvetia Pur. Money 5s, 1946	98	...
St. L., Rocky Mnt. & Pac. Stamped 5s, 1955	...	83
Tenn. Coal, Iron & R.R., Gen. 5s, 1951	91½	95½
Utah Fuel, 1st Sinking Fund 5s, 1931	87	...
Victor Fuel, 1st Mtg. Sinking Fund 5s, 1953	55	70
Virginia Iron, Coal & Cok 1st 5s, 1949	85½	88¾